

CACTUS AND SUCCULENT JOURNAL

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Of America

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No. 2



FIG. 18. Habitat photo of *Cephalocereus senilis*
by Hiroo Yoshida.



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GARDENS OPEN TO VISITORS
EN ROUTE TO CONVENTION

John E. C. Rodgers, 229 Eight St., Lorain, Ohio.
John Haag, 1117 Stryker Ave., St. Paul, Minn.
Missouri Botanical Gardens, 2315 Tower Grove Ave., St. Louis, Mo.
Margaret Radden, 10226 S. Bell Ave., Chicago, Ill.
Garfield Park Conservatory, Chicago, Ill.
Eden Park Greenhouses, Cincinnati, Ohio.
University of Michigan Greenhouses, Ann Arbor, Mich.
Will Rogers Park Greenhouses, Oklahoma City, Okla.
Fred A. Eisele, 586 Stratford, St. Louis, Mo.
The Polaski's, 1801 Coventry Lane, Oklahoma City.
Botanical Garden, University of California, Berkeley, Calif.
Robert J. Taylor, 936 Highway 80, El Cajon, Calif. (until July 9)
Conrad Eckstein, 2265 Carr St., Denver, Colo.
Mrs. C. M. Hunter, 8954 Oglesby Ave., Chicago, Ill.
Boyce Thompson Southwestern Arboretum, Superior, Ariz.
Desert Botanical Garden, Tempe, Ariz.
B. E. McKechnie, 1008 N. Holaguez, Carlsbad, New Mexico.
Carl Henscheid, Rupert, Idaho.
Clyde Gaylord, State Hospital, Jamestown, N. Dak.
Antony Barone, 214 Connecticut, Detroit, Mich.
Herman Tobusch, 614 Wisconsin, Villa Park, Ill.
The Cactus Gardens, 333 SE 82nd Ave., Portland, Oregon. Very fine collection.

It might be best to contact the private gardens for further information.

HOWARD E. GATES

FROM AUSTRALIA

Brisbane people seem to be appreciating the beauty of cacti and succulents. Many more plants are on sale than in the past. Several varieties in a pot are favorite Christmas gifts. Some people have the idea that one has only to plant in sand with a few stones on top and water occasionally. I find that my succulents do well with good rich soil mixed with coarse sand and very good drainage. I hose them every day in summer and every other day during our short winter.

MRS. LESLEY LOVE

FROM LA JOLLA, CALIFORNIA

In Hummel's Victory Picture Book is a picture of *Sedum Morganianum*. I have seen this same picture with the notation that the "Burro's Tail" sometimes grows to a length of 36 inches. I have such a plant

with one "tail" 60 inches long, 2 tails 52 inches long, 5 tails 47 inches, 3 tails 42 inches long, and the remainder 32 inches or less.

HOMA H. HOWARD

OREGON CACTUS SOCIETY

The officers for 1953 are as follows:
President, Russell Taylor.
Vice-President, Mrs. Mary E. Farber.
Secretary, Mrs. J. B. Lepley.
Treasurer, Mrs. Laura C. Lechleidner.

FROM OLYMPIA, WASHINGTON

Just received the *Johnson Jubilee Catalog* and it has revived my enthusiasm. I want to tell you about a watering gadget I have found. They are being sold in the kitchen ware stores as a baster for oven cooking. They are a king-size eye dropper made of Pyrex with a hard rubber bulb. It is ideal for spot watering among cacti without getting scratched.

MRS. LESTER BENTON

CONVENTIONEERS!

The Rocking Horse Cactus Gardens of 2415 W. Glenrosa, Phoenix, Arizona, invites all visitors en route to California on their way to the Cactus Convention, to a free tour of our gardens. A gratis plant will be given to any society member who visits us. Also our \$50,000.00 display of Indian Handmade Turquoise Jewelry will be open to the above visitors. We will be here at the gardens until the day before the convention opens, so that all who desire may visit us.

WM. MASTRANGEL

CACTUS EXPEDITION IN MEXICO

The Moorten family—Chester (Slim), Patricia and son, Clark, have returned to their home and interesting business in Palm Springs, California, from another successful cactus expedition all through Mexico—to the border of Guatemala and back the rugged west coast route of the proposed highway "International."

Touring and camping all the way in their special-built "covered wagon" truck, they spent seven weeks and traveled eight thousand miles. Most of it beyond the usual Tourist routes.

Field work included exploring, photographing, and collecting cacti, other succulents, orchids, wood specimens, seeds, minerals, crystals and unusual curios. Several hundred colored slides (Kodachrome 35 mm) recorded their trip.

"Mexico is truly great cactus-country," according to the Moorten family's enthusiasm and thrilling experiences chasing cactus!

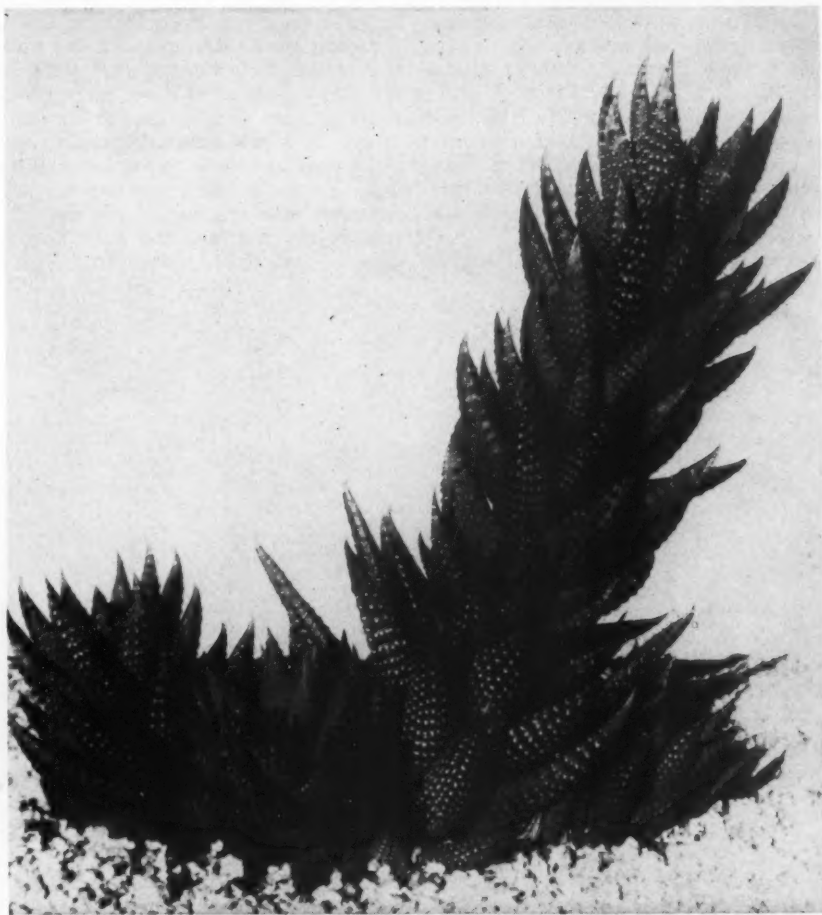


FIG. 19. *Haworthia fulva* G. G. Smith, nat. size.

NOTES ON HAWORTHIAS

By J. R. BROWN

Haworthia fulva G. G. Smith in Journ. So. Afr. Bot. IX (1943) 101, fig. 6 & Pl. II.

Plant with leafy stems about 11 cm. tall, about 4 cm. diam., proliferous from the base and forming dense clusters.

Leaves erect-spreading, about 3 cm. long, about 10 mm. broad towards the base, lightly incurved, but distinctly incurved at the tips, young leaves ovate-lanceolate, acute, the older leaves lanceolate acuminate; face of leaves convex, pale green, becoming greenish-brown when

older, smooth, or some leaves with a few small concolorous to whitish tubercles usually in a more or less distinct lengthwise row in the middle of the leaf; back rounded, keeled towards the tip, deep green with somewhat brownish tips, the young leaves somewhat shining towards tips, with about 12 transverse rows of small round to transversely oblong truncated tubercles, greenish-white in color, becoming white on the older leaves, the rows of tubercles 2 mm. apart at the middle of the leaf, also indistinctly arranged in about 11 lengthwise rows;

leaf-tips ending in a very short sub-pellucid point becoming brownish with age.

Locality: Cape Province: Bathurst Distr., near Port Alfred.

G. G. Smith remarks about this *Haworthia* (sect. *Coarctatae*) that: "The most distinctive feature of *H. fulva* which separates it from other related species is the permanent reddish-brown shading in the older leaves, from which colour it gets its name."

In cultivation the leaves may be somewhat

longer, broader and thicker than the dimensions previously given. It is noticeable that while the face of the young leaves is pale green during the growing season that on the approach of cooler weather (in So. California) the color changes to a pale brownish-green, so that the entire plant assumes a brownish tint. While on many leaves (of the plant shown here) the transverse rows of tubercles are about 2 mm. apart in the middle of the leaf, many leaves show the rows about 1 mm. apart.

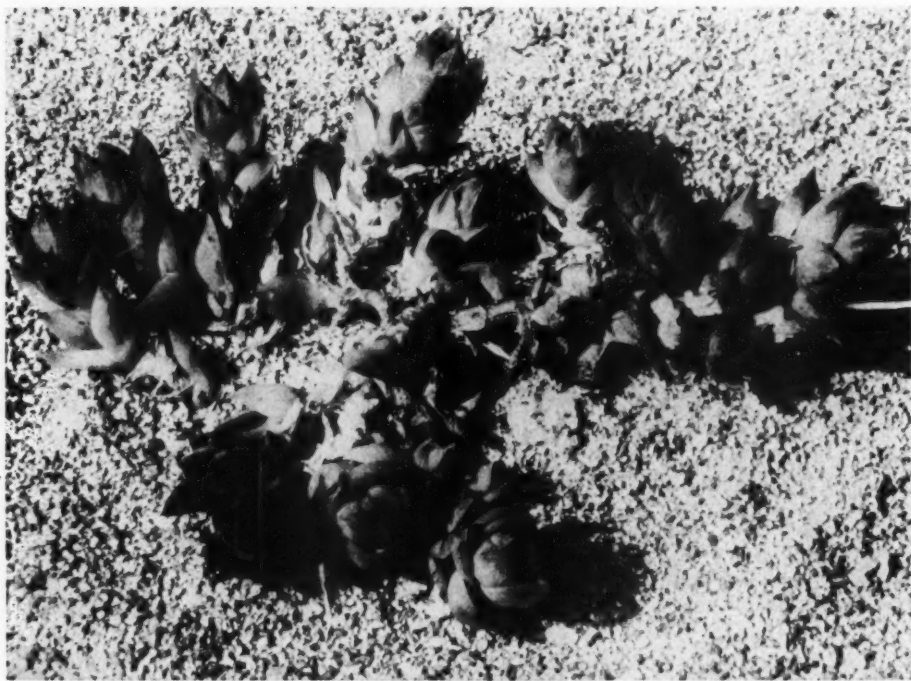


FIG. 20. *Haworthia ramosa* G. G. Smith. A young cluster somewhat reduced showing decumbent stems.

Haworthia ramosa G. G. Smith in Journ. So. Afr. Bot. X (1944) 22, fig. 8 & Pl. II.

Plant caulescent, the stem attaining a length of about 10 cm., becoming naked in the lower part and about 7 mm. diam., the leaves on the upper part forming elongated rosettes 5-6 cm. long, to 5 cm. diam., becoming densely branched from the axils of the soon withering lower leaves, the branches also developing numerous aerial roots, soon becoming decumbent and eventually forming dense clusters.

Leaves somewhat crowded, smooth, pale green, incurved, the young erect, the older erect-spreading, to 3.5 cm. long, to 22 mm. broad at the broadest part, 6 mm. thick towards the tip, broadly-obovate, somewhat abruptly acuminate; terminal awn about 1 mm. in length, smooth, reddish-pellucid; face of leaf concave in the upper part, with a somewhat raised, median, concolorous line and about 12 somewhat indistinctly reticulate lines and a few pellucid spots near the tip on some leaves; back rounded, with

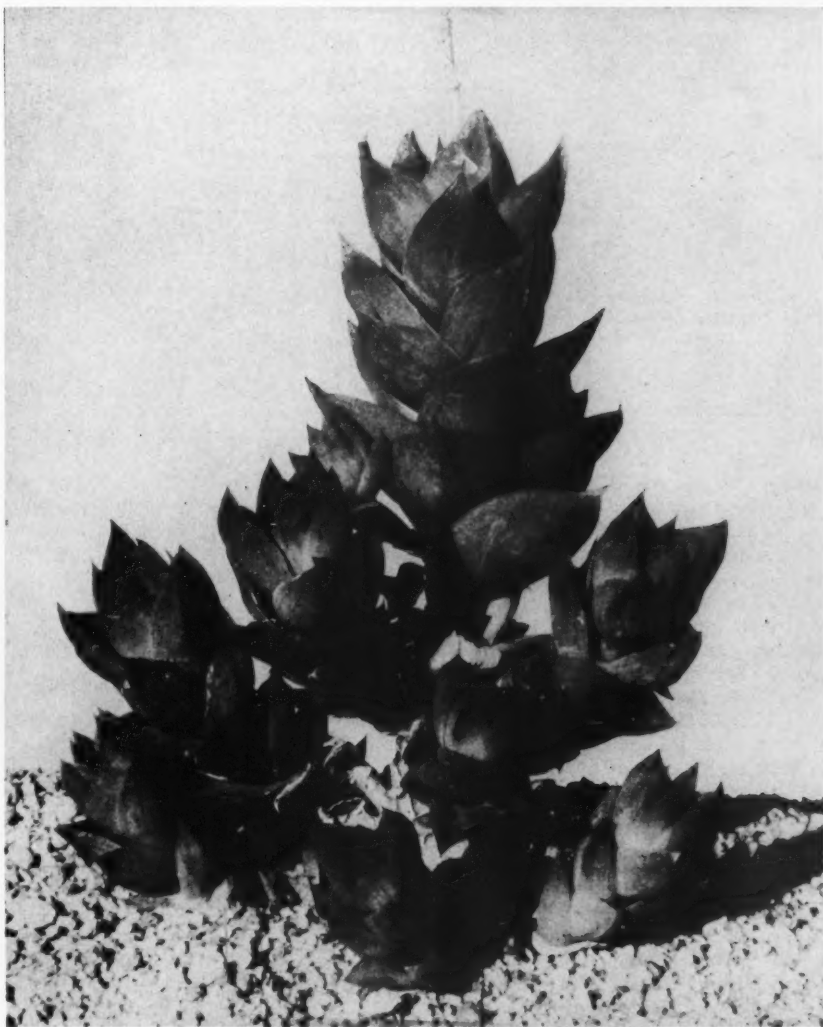


FIG. 21. *Haworthia ramosa* G. G. Smith, nat. size.

about 20 very indistinctly reticulate lines and several somewhat narrowly-oblong, lengthwise, longer and shorter pellucid spots near the tip; the older leaves becoming slightly reddish near the tip; keel entire, often oblique and with a shorter secondary keel; margins entire, greenish-white below, somewhat rounded and pellucid in the upper half.

Locality: Cape Province: Peddie Div., near Wooldridge.

G. G. Smith in his notes about this very inter-

esting *Haworthia* of the sect. *Obtusatae* says: "The name *ramosa* (branching) refers to the way in which this plant forms long branched stems, a character found in no other *Haworthia* in this section, so far observed."

The early withering of the older leaves with the consequent exposing of the whitish lower part of the stems, combined with the rapid development of numerous branches and long aerial roots give this *Haworthia* its distinctive character.

STUDIES OF SOUTH AMERICAN CACTACEAE

2. *Echinocactus humilis* Philippi

A Chilean Endemic with Primarily Juvenile Stems

By P. C. HUTCHISON¹

Echinocactus humilis Philippi was originally described in 1860. This description is inadequate and it has not been possible, in the absence of specimens, for subsequent authors to place the taxon in any of the genera now considered to encompass the echinocactoid species of Chile. The original description from *Florula Atacamensis* in Dr. R. A. Philippi's "Viage al Desierto de Atacama," 197, 1860, reads:

"138. *Echinocactus humilis* Ph. E. parvus, subglobosus, depressus, circa 12 lin. latus, 10 lin. altus; costis circa 10-12; verrucis superioribus aculeos circa 10, cinereos, setaceos gerentibus, quorum peripherici divaricati, centralis erectus; parum major, 12 lin. altus; aculeis verrucarum basium vix 1½ lin. longis, setaceis; corolla sulphurea, 9½ lin. longa.

Prope Paposo in detritu rupium ad pedes montium litoralium crescit."

Subsequent authors have added little information. Britton and Rose in *Cactaceae* 3: 89, 1922, suggested that this species might belong to their genus *Copiapoa*. Rose could not find the type at the Philippi Herbarium (Museo Nacional de Historia Natural, Santiago, Chile). My studies there likewise did not disclose a specimen. Presumably the type has not been preserved.

The type locality, Paposo, is on the coast of Province Antofagasta, Chile, about 50 km. north of the port of Taltal. I collected in this region in January, 1952, and found this species abundant in restricted areas near the road which swings up the coastal hills above Paposo. It is difficult to find because it grows partially buried in soil which it matches in color. The following description is compiled from field notes and studies of preserved as well as newly imported plants in cultivation at this botanical garden.

Copiapoa humilis (Philippi) P. C. Hutchison, comb. nov. *Echinocactus humilis* Phil. in Fl. Atac., 197, 1860, non Pfeiffer, 1837.²

Plant with a tuberous root 15 cm. or more long and ca. 5 cm. diam., root apex rounded or flattened. Mature plant solitary or caespitose, stem subglobose, glaucous green, usually con-

nected to root apex by a narrowly constricted stem elongation 5 to 10 mm. in diam. and ± 4 cm. long. Stem 5 to 7 cm. diam., 4 to 6 cm. high, ribs obscure, 8 to 12, tuberculate. Areoles grey-felted, spines grey, straight or slightly curved, radial spines 10 to 14, 5 to 15 mm. long, spreading to suberect, central spines 1 to 4, erect, porrect or barely decurved, 1.0 to 2.5 cm. long, darker apically. Flowers apical, lower third submerged in dense, grey, apical wool, campanulate, 3 cm. (2 cm. in type!) long, outer perianth segments yellow with a rose midstripe which on lower segments is broader, lowest segments rose narrowly margined yellow, inner segments dark yellow. Filaments, anthers and style dark yellow, stigma orange-yellow. Style 2.0 cm. long, lobes 9, 3 mm. long, minutely papillose, slightly exerted. Fruit semiglobose, truncate, 9 mm. diam., 8 mm. tall, with a single subapical ovate-acute scale 2 mm. broad and 3 mm. long, bright red.

Chile, Prov. Antofagasta, Dept. Taltal, coastal hills above Paposo, P. C. Hutchison 405 (UC).



FIG. 22. *Copiapoa humilis* (Phil.) Hutchison. Flower, $\times 1.6$; fruit, $\times 3$; from field collected material of P. C. Hutchison 405 preserved in fluid.

¹ University of California Botanical Garden (Berkeley) Contribution No. 128.

² Although it is a later homonym in the genus *Echinocactus*, the specific name is retained in accordance with Article 81 of the *International Code of Botanical Nomenclature*, 1952.

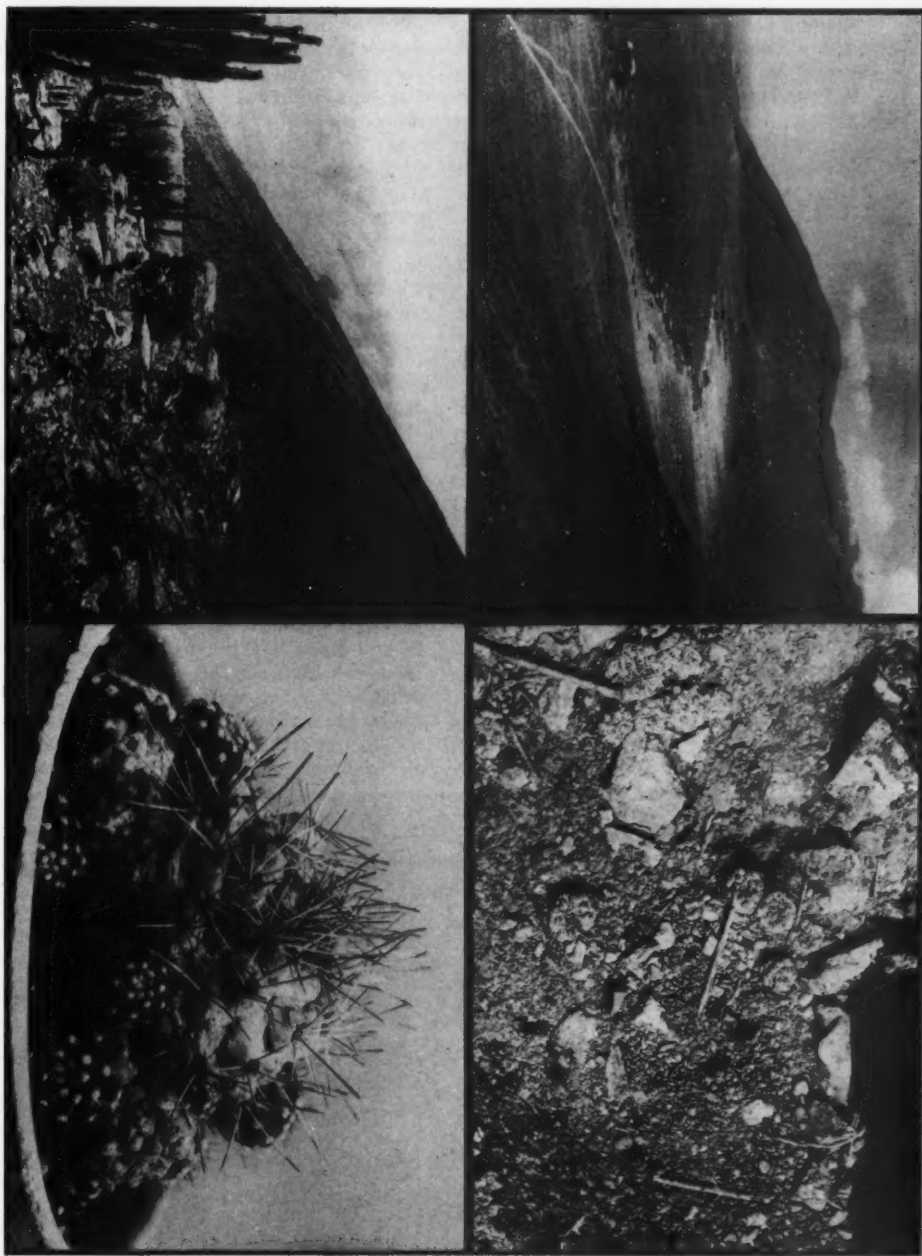


FIG. 23. (Top left) A view of Paposo on the coast of Prov. Antofagasta, Chile, Dec. 31, 1951. The hills are darkened by many plants of *Eulychnia* and *Trichocereus*. (Bottom left) View due north from the habitat of *Copiapoa humilis*. Among the shrubs are *Euphorbia lactiflua* Phil. and *Oxalis gigantea* Barn. both of which at higher altitudes, in the fog belt, are 4 or 5 times as large. (Top right) *Copiapoa humilis* immature stems in habitat. This photograph was taken at about 15 inches and shows the plants ca. x 0.3. 15 stems are visible and as many again are covered by surface gravel and debris. (Bottom right) *Copiapoa humilis*, mature plant (ca. x 0.7) in cultivation at the Univ. of Calif. Bot. Gdn. (Berkeley). The apical meristem was apparently damaged by the larva which emerged (?) through the hole seen in the center of the plant. The plant was found in flower and fruit but the meristem died before the plant was established in cultivation; subsequently most of the offsets seen at the base of the plant were formed.

Immature plants, or at least immature stems on mature roots constituted about 90% of the population at the type locality. These differ greatly from mature stems in most characteristics. A description of them is essential since the original description seems to combine characters of both immature and mature stages of growth, and since immature stems are likely to be collected in the future or may already be represented in some herbaria.

Immature stems semiglobose, 1 to 3.5 cm. diam. and tall, length and breadth usually equal, spines straight, radial spines *ca.* 10, setaceous, spreading, 2 to 5 mm. long, tan-grey or grey, central spine lacking or 1, suberect to porrect, to 1.1 cm. long, grey.

In cultivation many of the characteristics of *C. humilis* may change. Thus, at the University of California Botanical Garden (Berkeley), under glass, areolar and apical wool may be tan in color and may be more profuse; epidermis may be green or purple-green and glabrous; radial spines on immature stems are usually straw-colored with brownish tips; central spines are brown on immature, and black on mature stems. Further phenotypic changes will undoubtedly appear. The species can be grafted readily, but unless placed on a slow-growing stock, becomes abnormally bloated.

In nature the caespitose habit may arise in several ways. An old plant may form basal

offsets as its main stem begins to decline. When decline is rapid these offsets may not survive and the entire aerial stem dies. The root, however, may remain alive and from its crown send up elongated narrow growths to the soil surface 3 to 6 cm. above the root crown. These growths, because they bear aborted areoles at an early stage, are clearly cauline. When such a growth reaches the surface, a normal aerial plant stem develops. A root may form one or many such stems. They may arise from the root crown or from a former persistent stem-elongation. If this underground stem-elongation of the dying aerial plant stem persists, a new plant usually forms at its apex, and additional offsets may arise from its apex, from below it, from the root crown or from any combination of these, or not at all.

Thus it can readily be seen that the apparent maturity of the above ground stem is not a true indication of the age of the plant. It is indeed probable that the root and hypogean stem survive through the maturation of many generations of aerial stems.

Immature aerial stems occasionally form lateral fibrous roots in nature, and do so readily in cultivation. If the parent root dies these stems lose their attachment to it and each becomes established as an independent plant.

Copiapoa humilis survives under extremely adverse environmental conditions. Dessication

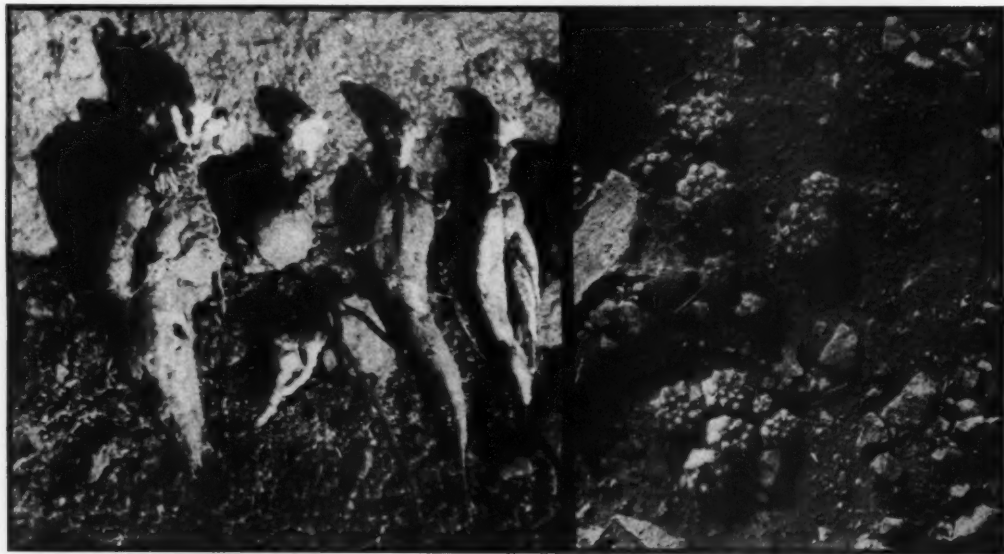


FIG. 24. *Copiapoa humilis* excavated plants showing mature tuberous roots, elongated necks and immature stems, *ca.* x 0.5. (Right) *Copiapoa humilis* immature stems in habitat, about x 0.3, clearly visible after slight surface excavation, showing 11 stems.

by coastal winds, intense insolation and high temperatures and slight to no precipitation as well as the attack of an insect parasite³ reduce the likelihood of flower formation. All plants of *Copiapoa taltalensis* (Werdermann) Looser, a closely related species which I examined in its area 100 km. to the south, were infested but apparently few of them were killed and the presence of the parasite did not inhibit flowering or fruiting. The larva apparently matures inside the plant body and consumes the parenchyma tissue. If the same or a similar species of beetle were to attack *C. humilis*, which is less than half the diameter of *C. taltalensis* it would attack only the most mature stems, as a small stem would not provide sufficient food to bring a larva to maturity. This might account for the fact that no immature stems or any of the smallest mature stems showed indications of insect damage, yet of the three large stems found, all were attacked. Two of them were dying and the third was nearly dead although it was flowering sparsely and had formed one fruit. The smaller mature (?) stems had formed apical wool and typical longer, stouter spines, but none was found in flower or with evidence of a previous year's flowering.

In nature few plants appear ever to attain flowering size. In addition to insect depredations the physical environment inhibits growth. The primary source of water for plants along this part of the Chilean coast is winter fog. The lower limit of fog, as shown by the luxuriant growth of epiphytes on cacti and shrubs at higher altitudes, is above the upper limit of this species. *C. humilis*, therefore, must receive much less water from condensation of fog than is available to plants higher up, and only in exceptional years, through lowering of the fog belt perhaps, or occurrence of a slight rain, would it receive an increase in water supply. It probably reaches maturity much more slowly than plants in the fog belt and then would be subject to attack by the larvae under conditions previously described. Even if the plant succeeds in flowering and forming seed prior to stem decay induced by the attack of the borer, cli-

matic conditions would usually not permit survival of seedlings if germination could take place. In other words, sexual reproduction of *C. humilis* must be much reduced in its natural state. Nevertheless, the mode of growth and vegetative reproduction of the species enables it to survive and the size of the population is not necessarily reduced by its failure to reproduce sexually.

In *Copiapoa* tuberous roots are common in many species. So far as known, *C. humilis* is unique in the genus for an attenuated neck connecting the stem to the root; in the tribe *Echinocactanae* for its ability and indeed dependence on vegetative reproduction for survival; in the family *Cactaceae* for the predominance of immature stem growths in nature (90% versus less than 1% in all other species and genera studied in the field).

The nature of these anomalies in *C. humilis* gives rise to a number of interesting questions. What is the species of insect which attacks this plant and what inter-relationships, if any, exist between their respective life-cycles and climate? Will the plant bloom freely and set viable seed in cultivation? Will it reproduce its peculiar morphological attributes if grown from seed or from cuttings? If, by contrast, a tuberous root develops, will it form before or after the plant stem becomes mature? The answers to certain of these questions may suggest an explanation of the morphological anomalies of this species in terms of the relative significance of environmental and genetic factors involved.

C. humilis is apparently more closely related to *C. taltalensis* than to any other presently known *Copiapoa*. The latter species occurs in the Sierra Esmeralda, a low range of coastal hills about 100 km. south of Paposo. I did not find plants of either species between these two localities. Apparently both are narrow endemics.

Dear Mr. Haselton:

I shall be out here in India and Pakistan for about a year.

During my stay here in South Asia I haven't yet had time to do much about the succulent plant life of the region due to the pressure of my work (research in the recent political history of India and Pakistan). In the Rajasthan area of India I noticed from a distance that the hills were covered with a candelabra-like *Euphorbia* stretching over great areas between Jaipur and Gwalior. Whether these were indigenous or introduced I don't know, but I rather suspect the latter, since one gets the impression of a single species having rapidly overrun the area.

A few large, flat-popped *Opuntia* are in evidence in West Pakistan. These, of course, were introduced—early in the period of European penetration into this area, I imagine. The *Opuntias* are not thriving here, however, for they are subject to the ravages of what appear to be a whitish fungus growth, and most of those I have seen have been in a rather sickly condition.

WILLIAM S. METZ

³ A buprestid larva taken from the root of *Copiapoa humilis* at Paposo, Chile, 31 Jan., 1952, was not determinable, even to genus, at the national collection at Washington, D.C. Another specimen, taken from the stem of *Copiapoa taltalensis*, from which it emerged at the botanical garden (Berkeley), was determined as "near *Poecilonoia* sp." This genus, however, is not previously recorded from Chile and it seems more likely that the latter specimen is related to *Ectinogonia*, several specimens of which I collected in the same area. The larval stages of these genera are apparently little known. I was not able to definitely link larval and mature forms of any *Buprestidae* taken in this area.

WHEN IS A CACTUS NOT A CACTUS?

By ELIZABETH NIXON ECKSTEIN

When is a "cactus" NOT a cactus? Sometimes when it looks most like one.

You say, "A cactus is prickly." So is a rose. And sometimes a cactus *isn't* prickly, but as smooth as the boss's bald pate.

"They don't have leaves," you continue. Neither do various Euphorbiae. And some cacti

do have leaves—large shiny beautiful ones, too.

"The pesky things live in the desert with no shade and no water," you persist, mildly pleased to pursue this good natured baiting of the cactiphile. Those sandy wastes are also the home of the Palo Verde, the Joshua tree, and the ocotillo, none of them cacti. And strange as it seems,

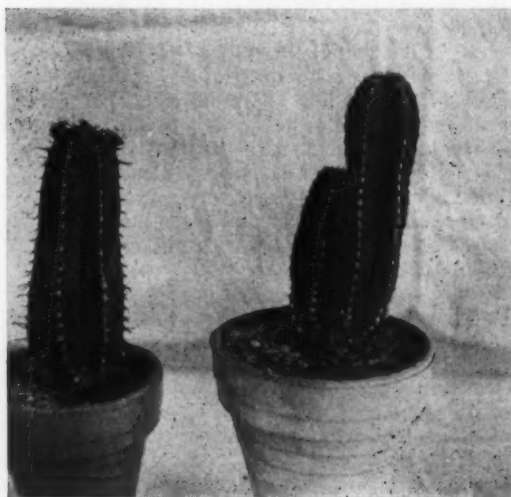


FIG. 25. (1)

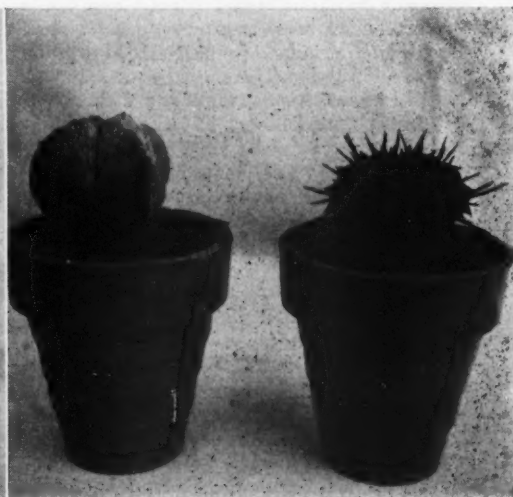


FIG. 26. (2)

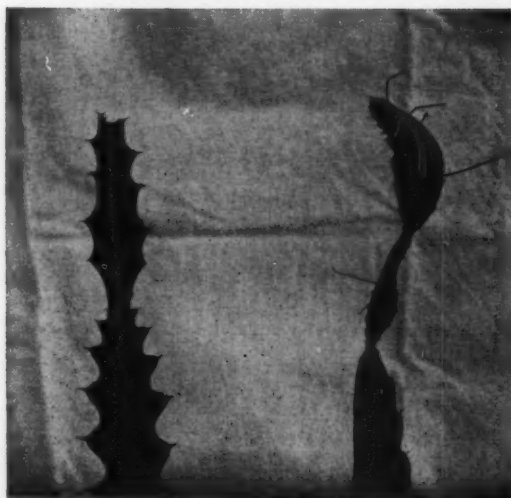


FIG. 27. (3)



FIG. 28. (4)



FIG. 29. (5)



FIG. 30. (6)

some cacti live in tropical forests with filtered sunlight and drenching rain.

"All right," you concede, "I don't know a cactus when I see one. So what?"

Well, nothing really. Except it is fun, for instance, to see the expression on Aunt Minnie's face when you inform her that her treasured "star cactus" in the parlor window *isn't* one.

"Land sakes," the old dear sputters. "All my life I've heard it called a cactus! And you say this Crown of Thorns isn't a cactus either?"

No, Aunt Minnie. But that smooth green

ball of a plant with the bits of "frayed rope" sticking out on top—the Dry Whiskey that Cousin Dan brought you for a joke—now that is one.

"Well I never! Then how can a body tell?"

For a technical answer, we list the following five characteristics:

1. Cacti are perennials.
2. Seedlings are dicotyledonous.
3. The fruit is a monocelled berry.
4. The flowers are borne above the fruit.
5. All cacti have areoles.



FIG. 31. (7)



FIG. 32. (8)



FIG. 33. (9)



FIG. 34. (10)

Various combinations of the first four characteristics may be present in other groups of plants. BUT—any plant possessing *all five* may safely be classified as a cactus. Conversely, without all five, *no* plant is a cactus, no matter how much it may look like one.

Actually, that Number Five—*areoles*—is the exclusive and ever-present trade mark of the cactus. Areoles are points of growth, usually round or oval in shape, often slightly depressed. They are the sole points of egress from the mysterious interior of these highly specialized plants. Whatever (a) glochids (short fine hairs or bristles); (b) spines, wool, or long hairs; (c) flowers; (d) new joints; (e) or leaves any given species produces, emerge from the areoles.

It is quite true that to enjoy cacti and other succulent plants one need not examine them in the cold light of botanical fact. But as one is increasingly exposed to the weird shapes, exotic flowers, strange colors and textures of this fantastic family, there develops a sort of sixth sense that identifies them. Also there are always those very special areoles. And it really is intriguing to be able to answer the question:

When is a "cactus" NOT a cactus?

Have you guessed which is a cactus and which not, of the pairs shown? See page 60 for correct names of these plants.



FIG. 35. (11)

EDITOR'S NOTE: The above article appeared in *The Green Thumb*, Colorado's Garden Magazine, which has been published for eight years for some 2300 gardeners. The author, Elizabeth Eckstein, was one of the Colorado group that entertained the Society so royally at the last convention.



FIG. 36. (Left) A plant matching well with *A. hemisphaericus*. (Right) *A. rotundifolius*. approx. nat. size.

THE GENUS ADROMISCHUS

By MYRON KIMNACH*

I

Among the *Crassulaceae* this highly intriguing group seems most ideal for the collector. It would be difficult to find plants that require less space or care, and despite their unspectacular appearance their compact and often attractive forms have a way of insinuating themselves into one's affections. And yet *Adromischus* is not a widely collected genus except for several of the more showy species. This is probably due to a general lack of familiarity with the genus as a whole, and it is hoped that a reading of the present review will infect the collector with a more proper enthusiasm. Probably the eventual distribution of some of the new or little known species recently imported by the University of California Botanical Garden (Berkeley) will also do much to increase the popularity of these plants.

The range of form and size within the genus is more extensive than commonly realized. The plants are usually short-stemmed or even rosette-forming, but a few have an erect or trailing growth. The green, grey or reddish leaves vary from small and globose to wide and flat, the largest being over 4" long. Cylindrical or hemi-

spherical leaves are less common as are those with a wavy crest at the tip. More have leaves that are smooth and waxy, though a pubescent or roughened surface is often found. Those that are brown- or reddish-spotted are by far the most popular with collectors. The flowers are not very showy, being reminiscent of *Haworthia*; they are more variable in shape, however, and in color range from white, through shades of red, to violet. The color orange is found so far only in one species, *A. phillipsiae*.

Adromischus species are found from central South West Africa through the Union of South Africa, including the Transvaal. Although a few, such as *A. rupicolus*, *A. mammillaris* and *A. marianae*, are distributed over a wide range, most are known from only one or two localities. Nearly half of the 50 species are in cultivation though others are gradually being introduced.

A few hybrids have been created, but despite occasional distinction most are unwelcome additions to an already polymorphic and confusing genus. Perhaps less haphazard crossing might result in something of horticultural value, however. Botanically it would also be interesting to confirm a rumoured crossing with *Cotyledon*.

Cultivation in any well-drained cactus soil is a simple matter if one is careful not to over-water. Several species (*A. berrei* and *A. schaeferianus*) are said to be deciduous, and while it is not necessary to so humor them in cultivation

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one should take care in watering the fleshy- or tuberous-rooted plants as they are liable to rot. Sunshine is the most important requirement of all, for in strong light the growth remains compact and the spotted-leaved species become more heavily marked. Unfortunately the main period of growth occurs in fall and winter when light is poor, the summer months being largely devoted to flowering. At present little is known of hardiness among species, although *A. festivus* is reported to have survived 19° F. They are easily propagated by cuttings, but it is more satisfactory to root the leaves; rot is less likely to occur if these are merely laid on the soil surface until roots appear.

Adromischus (from the Greek, meaning "stout-pedicelled") was established by Lemaire (1852). It is distinguished from *Cotyledon* in having flowers which are usually tubular and racemose rather than campanulate and paniculate. The close relationship of these two genera has been indicated by Dr. C. H. Uhl of Cornell whose studies (1948) show no cytological basis for separation. Moreover the leaf and flower characters of one genus intergrade with those of the other; *Cotyledon pygmaeum*, *C. sinus-alexandrii* and *C. buchholziana*, for example, approach *Adromischus* in having, besides similar vegetative growth, nearly tubular, erect flowers.

On the other hand such *Adromischus* species as *A. schaeferianus*, *A. casmithianus* and *A. philipsiae* have flowers closely resembling those of *Cotyledon*. Further study of these intermediates will be necessary before the boundary between the two genera is fixed with certainty, if indeed it will be maintained at all.

Due to its publication in an obscure horticultural journal, Lemaire's generic name was overlooked by later authorities until Berger resurrected it in his review (1930) of the *Crassulaceae*. When Karl von Poellnitz (1940) and C. A. Smith (1939) independently reviewed the group various taxonomic problems were solved and many new species described. The main contributions of each appeared only a year apart, but as neither had access to the other's later work unfortunate duplications and errors resulted. Von Poellnitz' work was published sporadically in several German publications, while Smith's appeared in a South African periodical of limited circulation. This lack of accessible literature is largely responsible for the fact that few amateurs are acquainted with the genus as it stands today.

As a further complication, in the years since the work of von Poellnitz and Smith a large number of *Adromischus* have been discovered that are clearly not referable to older species.



FIG. 37. *A. marianae*. The lower leaves of this imported plant were formed in its native habitat, while the upper two show the influence of cultivation in this country; note the adventitious leaf appearing on the end of a young inflorescence at left center. Nat. size, photo P. C. Hutchison. (Center) *A. berrei*, nat. size, photo P. C. Hutchison. (Right) *A. antidorcatum*, nat. size, photo M. Kimmach.

Few of these have been published as new but many are finding their way into cultivation and further confusing collectors who, as a rule, are unequipped to identify even published species. A monograph of *Adromischus* is not apt to appear until these newer plants are thoroughly studied; in the meantime it seems advisable to publish a compact and useful survey of the genus in its present state. This has been attempted in the key which follows.

Von Poellnitz composed no complete key to the genus but divided it into two sections according to peduncle length, a character greatly influenced by cultural conditions. C. A. Smith's key, which dealt with only 32 of the 50 species, divided the genus into alternate- and opposite-leaved species. This is also a highly inadequate character due to the lack of a clear-cut boundary between the two arrangements, and because truly opposite leaves do not even occur in *Adromischus*; those that appear so are separated by such short internodes that the alternate arrangement is obscured.

As we are not primarily concerned here with botanical relationships between species, the present key is based largely on leaf shape and markings rather than on floral details. It is true that the latter are less liable to change than are leaves, but if the plants are grown together under proper and equal conditions of light and moisture vegetative characters are quite suitable for a key. Furthermore leaves are always available

whereas *Adromischus* cannot be depended on to flower each year.

There are two ways in which this key may be used. In identifying an unnamed plant one proceeds from the beginning, choosing the most apt of the two descriptions in each numbered section until the correct name is arrived at; here a short description is given (further details can be found in the work cited after each specific name), as well as a listing of the more accessible illustrations of the species, if such exist. Or if one wishes to verify the name of a plant already labeled its number is first located in the alphabetical list of species and the corresponding description read; additional information is found by proceeding backwards to the key's beginning with the aid of the marginal numbers and reading incidental paragraphs.

It must be remembered that a plant unidentified by this or any other key may belong to one of the following categories: a new species, a hybrid, a divergent form of an older species, or a misshapen specimen due to poor cultivation. As an aid to identification then, what follows must be used with considerable caution. Several of the species listed are doubtfully valid and may be reduced to synonymy when the genus is more fully studied. Those preceded by an asterisk are at present in cultivation in this country.

Lists of synonyms, cited periodicals and other publications conclude this paper.



FIG. 38. *A. marianae*. The glossy surface makes photography difficult; $\times 1.5$, photo M. Kimnach.

II. LIST OF SPECIES WITH KEY NUMBERS

<i>alstonii</i> 45	<i>halesowensis</i> 14	<i>marianae</i> var.	<i>saxicolus</i> 42
<i>antidorcatum</i> 12	<i>hemisphaericus</i> 30	<i>immaculatus</i> 30	<i>schaeferianus</i> 5
<i>bolusii</i> 39	<i>herrei</i> 25	<i>marlothii</i> 35	<i>schoenlandii</i> 26
<i>caryophyllaceus</i> 39	<i>hoerleinianus</i> 4	<i>nanus</i> 19	<i>schuldtianus</i> 42
<i>casmithianus</i> 41	<i>humilis</i> 2	<i>nussbaumerianus</i> 44	<i>sphenophyllus</i> 17
<i>clavifolius</i> 32	<i>juttae</i> 20	<i>pachylophus</i> 29	<i>subcompressus</i> 14
<i>cooperi</i> 7	<i>kesselringianus</i> 7	<i>phillipsiae</i> 23	<i>subpetiolatus</i> 19
<i>cristatus</i> 28	<i>kleinioides</i> 34	<i>poellnitzianus</i> 27	<i>subrubellus</i> 38
<i>festivus</i> 9	<i>kubusensis</i> 32	<i>procurvus</i> 22	<i>tricolor</i> 10
<i>filicaulis</i> 35	<i>maculatus</i> 21	<i>rhombifolius</i> 16	<i>triebneri</i> 17
<i>fusiformis</i> 10	<i>mammillaris</i> 34	<i>roaneanus</i> 36	<i>triflorus</i> 45
<i>grandiflorus</i> 37	<i>marianae</i> 12	<i>rotundifolius</i> 37	<i>umbraticolus</i> 44
		<i>rupicolus</i> 21	<i>zeyheri</i> 28

III. KEY

ADROMISCHUS Lem. in Jard. fleur. II, Misc. 59. 1852.

1. Leaves spotted brown, reddish or green. 2
Leaves unspotted. 22
2. Leaves ovoid to globular, usually less than 2 cm. long, with minute red dots or streaks. 4
Leaves much longer or wider than thick, usually over 2 cm. long, markings larger (except in next species) 3
3. Leaves in a dense stemless Echeveria-like rosette, upper sides concave, lower convex, in cultivation to 4 cm. long, 2 cm. wide; corolla-tube yellowish-green, lobes purple: *A. HUMILIS* (Marl.) C. A. Sm. in Bothalia III, 639. 1939. Ill.: Marl., Fl. S. Afr. 2: t. 3. Central Cape Province.
Leaves not in a dense rosette, and tending to form a stem; red spots larger. 6
4. Corolla-lobes as long as the tube, the entire corolla greyish-violet; main stem 5-20 mm. long; leaves 1½-2 cm. long, 7-12 mm. wide, upper side grooved: **A. HOERLEINIANUS* (Dint.) v. P. in Fedde 48:91. 1940. Great Namaqualand (S. W. Africa).
Corolla-lobes half as long as the tube. 5
5. Corolla-lobes rose or greyish-violet, tube greenish; roots tuberous; main-stem nearly lacking, or to 4 cm. long; leaves slightly concave on upper side, 1-3 cm. long, often deciduous at flowering time: **A. SCHAEFERIANUS* (Dint.) Berg. in Nat. Pl. 18a:416. 1930. Ill.: Fl. Plts. S. Afr. 10:t. 394. S. W. Afr. and Little Namaqualand. In its native habitat this tiny Conophytum-like plant closely resembles the pebbles among which it grows.
Corolla-lobes white, otherwise identical with the preceding: **A. SCHAEFERIANUS* var. *KEILHACKII* (Werd.) v. P. in Fedde 48:94. 1940. Ill.: Kakt.:131. 1934. S. W. Africa.
6. Leaves widened at end. 7
Leaves not widened at end. 8
7. Leaves often with a few greenish or reddish spots due to loss of the waxy coating, much flattened, with a very wavy end; pedicel 5-10 mm. long, corolla-lobes white, the tips reddened: *A. KESSELRINGIANUS* v. P. in Kakt.:64. 1940. Ill.: l. c., 65. Cape Province (?).
Leaves with many large reddish-brown spots, nearly terete with a slightly wavy end; pedicel lacking, corolla-lobes red: **A. COOPERI* (Bak.) Berg., l. c., 416. 1930. Ill.: Cact. Jrn. 16:97. 1944; Nat. Cact. Jrn. V:29. 1950. S. Cape Prov. The plant commonly grown and illustrated under this name is *A. festivus*, but the true species, or a plant closely resembling it, has recently been introduced here.
8. Leaves terete, without a flattened area. 9
Leaves with a flattened area. 11
9. Leaves becoming flattened at end, otherwise nearly terete, to 2 cm. wide; plant almost stemless; corolla-lobes white to reddish: **A. FESTIVUS* C. A. Sm., l. c., 633. 1939. Ill.: J. R. Brown, Succ. f. Am. 76; C. A. Sm., l. c., 634; Nat. Cact. Jrn. IV:35. 1949. Central Cape Prov. This beautiful species is usually mistaken for *A. cooperi*.
Leaves with an acute conical end, not over 1 cm. wide. 10
10. Stem to 3 cm. high, leaves "opposite" (probably only appearing so), purple-spotted, to 6 cm. long, 7 mm. wide; corolla-tube green, lobes white to purple: *A. TRICOLOR* C. A. Sm., l. c., 632. 1939. Western Cape Prov.
Stem to 20 cm. high, leaves alternate, "minutely dotted," otherwise identical with the preceding: *A. FUSIFORMIS* (Rolf) Berg., l. c., 416. 1930. Locality unknown, flowered at Kew in 1916. An unclarified species. The stated height of stem was perhaps intended to include the inflorescence, while the leaf-dots, as von Poellnitz suggests, may be no more than the wax-glands visible in many species. It will probably prove synonymous with *A. mammillaris*.
11. Leaves flattened, or grooved, on only one side. 12
Leaves flattened on both sides. 13
12. Leaves roughened, the flattened or concave side without a distinct border, to 4 cm. long, to 1 cm. wide and thick; flowers nearly sessile, the limb hardly wider than the tube, the lobes white with a reddish tip: **A. ANTIDORCATUM* v. P. in Fedde 44:61. 1938. Ill.: Fig. 37, Cact. Jrn. Br. 7:18. 1938. Little Namaqualand. The specific name is due to the plant being found near the town of Springbok, which is also the name of a local species of antelope belonging to the genus *Antidorcas*.

- Leaves smooth*, the flat or often concave side with a white horny edge, to 6 cm. long; corolla-tube green, the limb considerably wider than the tube, lobes white with a rosy tip. *A. MARIANAE (Marl.) Berg., l. c., 416. 1930. Ill.: Fig. 37; Marl., Fl. S. Afr. 2:t. 3. Western Cape Prov. A handsome species of rather difficult culture.
13. *Leaves little broader than thick*, dots few and minute. 14
- Leaves little broader than thick and very flat*. 15
14. *Leaves more flattened at the wedge-shaped end* and there with faint dots, to 7 cm. long, to over 2 cm. wide, light green; stem 1 cm. thick; corolla-lobes reddish: A. HALEOWENSIS Uitew. in Succ.: 36. 1950. Ill. (as *A. cuneatus* v. P.): Beitr. z. Sukk.: 64. 1940. E. Cape Prov.
- Leaves flattened evenly along entire length* but tapered at ends, dark green, to 6 cm. long and 1½ cm. wide; stem ½ cm. thick; corolla-lobes purple: A. SUBCOMPRESSUS v. P. in Fedde 44:61. 1938. Ill.: Des. Pl. L.: 167. 1938. Bushmanland to Namaqualand.
15. *Leaves with few or many small dots*. 16
- Leaves with many large spots*. 18
16. *Leaves rhombiform*, minutely dotted in the upper half, purplish on edges; stem strongly branched, decumbent; corolla-tube green: A. RHOMBIFOLIUS (Haw.) Lem., l. c., 60. 1852. S. Cape Prov. The identity of this species is very unsettled, although plants so named are found in cultivation.
- Leaves obovate*. 17
17. *Leaves rounded at end or notched*, 3-6 cm. long, from half as wide to as wide, dots scattered; forming a thick stem to 10 cm. high; corolla-tube reddish-green, lobes reddish, 1 mm. long: A. TRIEBNERI v. P. in Beitr. z. Sukk.: 18. 1939 (with ill.). Little Namaqualand.
- Leaves with a small point at tip* but otherwise rounded, to 11 cm. long, 5 cm. wide, with faint green flecks on upper half; nearly stemless; corolla-tube green, lobes pale pink, 4 mm. long: *A. SPHENOPHYLLUS C. A. Sm., l. c., 624. 1939 (discovered before 1820). Ill.: J. R. Brown, Cact. Jrn. 17: 150. 1945; Saunders, Refugium Botanicum I: t. 36. 1869 (as *A. rhombifolius*). S. Cape Prov. The largest-leaved species.
18. *Leaves not more than 2.5 cm. long and wide*. 19
- Leaves over 2.5 cm. long*. 20
19. *Forming a stem to 10 cm. high*, leaves 1.5-2.5 cm. long and almost as wide, without a horny edge; flowers unknown: *A. SUBPETIOLATUS v. P. in Fedde 44: 61. 1938. Ill.: Beitr. z. Sukk.: 78. 1941. S. Cape Prov.
- Nearly stemless*, leaves up to 1.5 cm. long and wide, with a white horny edge; corolla subsessile, tube reddish-brown, lobes rosy-purple: A. NANUS (N. E. Br.) C. A. Sm., l. c., 640. 1939 (with ill. pp. 649-650). E. Cape Prov. Although this appears to be a dwarf form of *A. rupicolus*, Smith states in a letter that the two species are quite distinct both in cultivation and in the field, where they often grow within a few feet of each other.
20. *Leaves gradually acute*, 2.5-4 cm. long, 1-2 cm. wide, 3-8 mm. thick, with large gaps in the wax coating, not half-clasping the stem which is to 7 cm. high; pedicel 2-3 mm. long, corolla-tube reddish-brown, lobes pale-violet: A. JUTTAE v. P. in Kakt.: 52. 1939 (with ill.). Great Namaqualand (S. W. Africa) and Bushmanland (S. Afr.). Named for Jutta Dinter, wife of the famous authority on S. W. African plants.
- Leaves obtuse or with a small abruptly acute point at end*. 21
21. *Leaves half-clasping stem*, to 8 cm. long, usually longer than wide; stem to 10 cm. high; corolla sessile, tube green, lobes white: *A. MACULATUS (S.-D.) Lem., l. c., 60. 1852. Ill.: Nat. Cact. Jrn. 6: 34. 1951. S. W. Cape Prov. Several variations of the true species are now in cultivation here.
- Leaves not clasping the stem*, usually almost as broad as long; stem short and stubby; pedicel to 10 mm. long, corolla-tube reddish-purple, lobes pale purple: *A. RUPICOLUS C. A. Sm., l. c., 642. 1939. Ill.: Nat. Cact. Jrn. 6: 33-34. 1951; J. R. Brown, Succ. f. Am., Figs 37 and 143 (as *A. maculatus*). Widely distributed from the Transvaal to S. W. Africa. Common in cultivation, being often wrongly labeled *A. maculatus*; both species are outstanding for their beautifully mottled leaves. Von Poellnitz considered this plant to be *A. trigynus* (Burch.) v. P., a species based on such fragmentary material and data that its identity with *A. rupicolus* is at best a questionable assumption.
22. *Corolla-tube distinctly curved*, nearly sessile; tube dark purple, lobes acute, pale rose-purple; leaves olive-green, without spots, narrow-cuneate, subtruncate, terete at base, 3-5 cm. long, 15-22 mm. wide: A. PROCURVUS (N. E. Br.) C. A. Sm., l. c., 641. 1939. Habitat unknown. A doubtful species, supposedly unique in having a curved corolla-tube; in Smith's present opinion it was most likely based on a specimen whose inflorescence had been distorted by the attack of aphids.
- Corolla-tube not curved*, leaves without spots. 23
23. *Flowers pendent*, over 1" long, orange-red; stem branched, to 5 cm. high; leaves flattened and channeled above, obovoid when young, later linear-lanceolate, dark green, reddish on under side, to 1½" long, ½" wide: A. PHILLIPSIAE (Marl.) v. P. in Fedde 48:88. 1940. Ill.: Marloth, Fl. S. Afr. 2, 1: fig. 5, t. 3b. Western Cape Prov. The large pendent orange flowers are unique in the genus.
- Flowers horizontal to erect*. 24
24. *Leaves finely hirsute or roughened*. 25
- Leaves smooth*. 29
25. *Leaves finely hirsute*. 26
- Leaves not hirsute*, but roughened with tubercles, greenish-red to brownish-black, ovoid, acute, 1-3 cm. long, 8-14 mm. thick; roots thickened; 2-3 flowered, pedicels 1½ cm. long, corolla-

- tube reddish-green, lobes purple to rose: *A. HERREI (Bark.) v. P. in Fedde 44: 62. 1938. Ill.: Fig. 37: Jacobsen, Succulent Plants, p. 55 (as *Cotyledon*). 1935. Namaqualand. This exceedingly slow-growing dwarfed species is both the least attractive and most interesting in the genus. Its brownish wrinkled leaves rather resemble raisins.
26. *Leaf-end flattened but not widened*, otherwise terete, abruptly narrowed at base, $3\frac{1}{2}$ cm. long, 1 cm. wide; stem to 4 cm. high, with aerial roots; corolla-tube reddish-green, lobes reddish-white: *A. SCHOENLANDII (Phillips) v. P. in Cact. Jrn. Br. 6: 68. 1939. Ill.: Fl. Plts. S. Afr. 9: t. 328. 1929; Nat. Cact. Jrn. VII: 33. 1952. Cape Prov. This species and *A. clavifolius* are often considered synonymous, but the two plants in cultivation under these names are quite distinct.
- Leaf-end flattened and widened*.....27
27. *Leaf nearly terete*, gradually narrowed to base, 5-10 cm. long; stem branched, to 5 cm. long, with aerial roots; corolla-tube green, lobes white, red-tipped: *A. POELLNITZIANUS Werd. in Fedde 39: 270. 1936. Ill.: J. R. Brown, Succ. f. Am., fig. 141. S. E. Cape Prov.
- Leaf nearly flattened*, abruptly narrowed at base or sometimes gradually so, the end widened and wavy, 2-5 cm. long.....28
28. *Stem erect*, with aerial roots; peduncle, calyx and corolla bare, the latter greenish-red or red, lobes white, red-tipped: *A. CRISTATUS (Haw.) Lem., l.c., 59. 1852. Ill.: J. R. Brown, Succ. f. Am., fig. 141. S. E. Cape Prov. This is a deservedly popular species due to its red-haired stems and wavy, paddle-shaped leaves.
- Stem prostrate*, rooting at nodes, without aerial roots; peduncle, calyx and corolla hirsute: A. ZEYHERI (Harv.) v. P. in Cact. Jrn. Br. 6: 88. 1938. S. W. Cape Prov.
29. *Leaf-end widened* and straight-edged; stem to 3-5 cm. high; leaf to 7 cm. long, to 3.5 cm. wide, oblong-cylindrical with a petiole-like base and expanded crest, grey-green; corolla-tube green with a reddish tinge, lobes ovate, acuminate, pale red: A. PACHYLOPHUS C. A. Sm., l.c., 633. 1939 (discovered in 1896). S. E. Cape Prov.
- Leaf-end not widened*.....30
30. *Leaves hemispherical*, flat above, round below, 1.5-3.5 cm. long and about as wide; stem up to 20 cm. long; corolla-tube grey or reddish, lobes white to rose: *A. HEMISPHERICUS (L.) Lem., l.c., 60. 1852. Ill.: Fig. 36; De Candolle, Hist. Pl. Grass.: t. 87. 1799-1829. W. Cape Prov. into S. W. Africa.
- Leaves semi-terete*, flat or grooved above, round below, 2 to 5 times longer than wide; stem very short; corolla-tube green, lobes white with a rosy tip: A. MARIANAE var. IMMACULATUS Uitew. in Succ.: 10. 1953 (with ill.). W. Cape Prov. Differs from *A. marianae* only in having unmarked leaves.
- Leaves neither hemispherical nor semi-terete*.....31
31. *Leaves spindle-shaped*.....32
- Leaves distinctly flattened on both sides*.....36
32. *Leaves entirely terete*.....36
- Leaves slightly flattened on one side near tip*, otherwise terete, ending in an indistinct, nearly straight margin, 5-9 cm. long, 1-1.75 cm. wide, white or reddish, with a coating of wax; stem without aerial roots; pedicel 10-12 mm. long, corolla-tube pruinose: *A. KUBUSENSIS Uitew. in Succ.: 7. 1953 (with ill.). Namaqualand.
- Leaves slightly flattened on both sides near tip*, otherwise nearly terete, ending in a pronounced undulate border, 3-7 cm. long, 9-15 mm. wide, green or tinged red, without a waxy coating; stem covered with aerial roots; pedicel 2 mm. long, corolla-tube green: *A. CLAVIFOLIUS (Haw.) Lem., l.c., 60. 1852. Ill.: J. R. Brown, Succ. f. Am., fig. 141; v. P. in Des. Pl. L.: 26. 1938. (Ill. in Jacobsen, Succulent Plants, shows *A. mammillaris*.) S. E. Cape Prov.
33. *Forming a long stem*.....34
- Almost stemless*.....35
34. *Stem prostrate*, rooting at nodes; leaves spindle-shaped, sometimes slightly flattened on upper side, $1\frac{1}{2}$ -7 cm. long, grey-green; corolla-tube green or somewhat brownish, lobes white and purple or pale purple: *A. MAMMILLARIS (L.) Lem., l.c., 60. 1852. Ill.: Jacobsen, Succulent Plants, fig. 6 (as *A. clavifolius*); v. P. in Des. Pl. L. 10: 114. 1938. (The plant pictured in J. R. Brown, Succ. f. Am., 1st ed., fig. 141 is a common but undescribed species or hybrid. S. W. Cape Prov. The leaf-shape and trailing habit of this plant are remarkably similar to those of *Kleinia radicans*, a member of the *Compositae*. Its sprawling growth is best accommodated in a wide shallow pan or hanging basket.
- Stem erect*, not rooting at nodes; to 50 cm. high and 2 cm. thick; leaves as in *A. mammillaris*; corolla-tube yellowish-green or brown, lobes dull reddish-brown: A. KLEINIOIDES C. A. Sm., l.c., 631. 1939 (discovered about 1873). Ill.: Curtis' Bot. Mag. 99: t. 6020. 1873. Little Namaqualand.
35. *Leaves tapered only toward base*, upper end blunt, grey-green; stem 4 cm. high; corolla-lobes pale red, lanceolate, reflexed: A. MARLOTHII (Schonl.) Berg., l.c., 416. 1930. S. W. Cape Prov.
- Leaves tapered at both ends*, $1\frac{1}{2}$ -2" long; flowers subsessile, corolla with a short spreading limb: A. FILICAULIS (E. & Z.) C. A. Sm., l.c., 630. 1939. Little Namaqualand. Neither species has been rediscovered and their validity is questionable.
36. *Stem erect, elongated*.....37
- Stem lacking or very short*.....40
- Stem straggling, procumbent, elongated*; leaves nearly orbicular, 1.5-3 cm. long, almost as wide, to 1 cm. thick; corolla-lobes white, purplish at tips: *A. ROANEANUS Uitew. in Nat. Cacti.

- Jrn. 7:70. 1952 (with ill.). W. Cape Prov. A quick-growing species best kept as a hanging plant.
37. *Leaves distinctly longer than wide*.....38
Leaves nearly orbicular, 2.5-3.5 cm. long, 2-2.5 cm. wide, slightly convex on both sides, grey-green; stem thick, erect; inflorescence many-flowered, corolla-limb 5 mm. wide, lobes 2 mm. long, purplish-white: **A. ROTUNDIFOLIUS* (Haw.) C. A. Sm., l.c., 627. 1930. Ill.: Fig. 36; Kakt.: 17. 1940; R. A. Dyer in Curtis' Bot. Mag.: t. 9368. 1934. S. W. Cape Prov.
- Leaves fan-shaped* (obovate-cuneate), 1-1.5 cm. long, 1-2 cm. wide, 4-7 mm. thick, convex on both sides, grey-green; stem thick, erect; inflorescence with 2-5 flowers, corolla-limb 14-15 mm. wide, lobes 4 mm. long, purplish-white: **A. GRANDIFLORUS* Uitew. in Succ.: 8. 1953 (with ill.). S. W. Cape Prov. A large-flowered species that spreads rapidly by means of its easily-detached leaves. Its pronounced tendency to elongate under cultivation can be overcome by underwatering, poor soil and much sunlight.
38. *Leaves nearly truncate, or emarginate*, green with a reddish tinge, obovate-cuneate, 5-6 cm. long, 3-4 cm. wide; stem to 10 cm. long; corolla-lobes only 1 mm. long, whitish or greenish: *A. SUBRUBELLUS* v. P. in Fedde 50: 319. 1940. Little Namaqualand.
- Leaves rounded at end or subacute*.....39
 39. *Inflorescence and main-stem branched*; leaves oblong, 1-3 cm. long, .9-1.3 cm. wide, green; flowers pedicelled, corolla-tube green, the lobes white to purple: **A. CARYOPHYLLACEUS* (Burm. f.) Lem., l.c., 60. 1852. Ill.: Burman, *Rariorum Afr. plant.* t. 17. 1738. Central Cape Prov. This very old species has comparatively large and attractive flowers whose slight resemblance in form to those of the family *Caryophyllaceae* (to which the Pink and Carnation belong) prompted the specific name.
- Inflorescence unbranched*, corolla-lobes keeled, otherwise resembling the preceding: *A. BOLUSII* (Schönl.) Berg., l.c., 416. 1930. Ill.: Rice and Compton, *Wild Fls. Cape Good Hope*: pl. XLIX. 1951. Cape Prov. A little-known and perhaps invalid species.
40. *Leaves less than 4 cm. long*.....41
Leaves more than 4 cm. long.....43
 41. *Leaves nearly as wide as long*, obtuse, light-green, thick, 6-14 mm. long; roots tuberous, whole plant only to 4 cm. high; flower shaft 1½ cm. high, flowers erect, corolla-tube reddish-green, widening toward the throat, lobes red: *A. CASMITHIANUS* v. P. in Beitr. z. Sukk.: 43. 1940. Ill.: Des. Pl. L. 10: 228. 1938—as *A. nanus* (N. E. Br.) v. P. S. W. Africa.
- Leaves distinctly longer than wide*.....42
 42. *Leaves equally narrowed at both ends*, densely clustered, linear-oblong, to 3.5 cm. long and 1 cm. wide, to 5 mm. thick, convex on both sides, green, pale rose near tip; corolla-tube purplish, lobes purple with paler margins: *A. SAXICOLUS* C. A. Sm., l.c., 647. 1939. Transvaal.
- Leaves usually obovate*, clustered, oblong, about 2.5 cm. long, 1 cm. wide, 3-4 mm. thick, convex on both sides, green, with a deciduous waxy coating; flowers unknown: *A. SCHULDTHIANUS* v. P. in Jahrb. D. Kakt. Ges. 1: 95. 1936. S. W. Africa (?).
43. *Leaves green or pinkish*.....44
Leaves grey or greyish-green.....45
 44. *Leaves with a distinct petiole* 3-4 mm. long, obovate-oblong, convex below, flat above and often concave near the tip, 4-5.5 cm. long, 17-21 mm. wide, 7-8 mm. thick; stem very short; pedicel 1-2 mm. long, corolla-tube reddish-green, lobes reddish: *A. NUSSBAUMERIANUS* v. P. in Jahrb. D. Kakt. Ges. 1: 95. 1936. Cape Prov.
- Leaf petiole indistinct or lacking*, oblong to obovate-cuneate, convex on lower side, flat or convex on the upper, to 5 cm. long and 2 cm. wide, 4 mm. thick, green, often pinkish near tip, pedicel 6-10 mm. long, corolla-tube and lobes purple: **A. UMBRATICOLUS* C. A. Sm. in Onderstepoort Journ. Vet. Sc. & An. Ind. 1: 174. 1933. Ill.: C. A. Sm. in *Bothalia*, l.c., 646. 1939 (with reprinted original description). Transvaal. Though of a drab appearance this species, whose name means "shade-dwelling," has surprisingly pretty flowers. With several *Cotyledons* it is known to be poisonous to grazing livestock.
45. *Leaves to 7 cm. long*, 2.5 cm. wide, obovate, obtuse; corolla-tube green, lobes deltoid-acuminate, pale rose; flowers usually in one's: *A. ALSTONII* (Schönl. & Bak. f.) C. A. Sm., l.c., 638. 1939. Little Namaqualand.
- Leaves to 5.5 cm. long*, 2.5 cm. wide, obovate, obtuse; corolla-tube reddish-green, lobes ovate, obtuse, white on upper surface, reddish on the lower; flowers usually in three's: *A. TRIFLORUS* (L. f.) Berg., l.c., 416. 1930. Ill.: Lemaire, l.c., 61. 1852 (flower only, as *A. robustus*); fig. 141 in J. R. Brown, *Succ. f. Am.* depicts an unidentified spotted-leaved species. W. Cape Prov.

IV. SYNONYMS, ETC.

- A. cuneatus* Lem., l.c., 60. 1852: *COTYLEDON PAPILLARIS*
A. cuneatus v. P. in Fedde 48: 109. 1940: *A. HALESOWENSIS*
A. jasmminiflorus (S.-D.) Lem., l.c., 60. 1852: *A. CARYOPHYLLACEUS*
A. keilhackii Werd. in Fedde 30: 52. 1932: *A. SCHAEFERIANUS* var. *KEILHACKII*
A. leucothrix C. A. Sm., l.c., 637. 1939: *COTYLEDON LEUCOTHRIX* æ
A. mammillaris var. *ruber* v. P. in Fedde 49: 61. 1940: *A. KLEINIOIDES*
A. montium-kinghardii (Dint.) Berg., l.c., 416. 1930: *A. HEMISPHERICUS*
A. mucronatus (Lamk.) Lem., l.c., 60. 1852: *COTYLEDON UNDULATUS* var. *MUCRONATA*
A. nanus (N. E. Br.) v. P. in Des. Pl. L. 10: 228. 1938, not *A. nanus* (N. E. Br.) C. A. Sm.:
A. CASMITHIANUS
A. rhombifolius var. *bakeri* v. P. in Fedde 48: 102. 1940: *A. MACULATUS*

A. robustus Lem., l. c., 60. 1852: *A. TRIFLORUS*

A. sphaerophyllus C. A. Sm., l. c., 620. 1939: a name mentioned in Smith's key, but without valid description.

A. trigynus (Burch.) v. P. in Fedde 44: 61. 1940: an inadequately described species.

A. van-der-beydeni Hort. ex Berg., l. c., 416. 1930: *A. CLAVIFOLIUS*

V. PERIODICALS CITED

Beitr. z. Sukk.: Beiträge zur Sukkulantenkunde und -pflege, Germany

Cact. Jrn.: Cactus and Succulent Journal, Pasadena, Calif.

Cact. Jrn. Br.: Cactus and Succulent Journal of Great Britain

Curtis' Bot. Mag.: Curtis' Botanical Magazine, England

Des. Pl. L.: Desert Plant Life, Pasadena, Calif.

Fedde: Fedde, Repertorium spec. nov. reg. veg., Germany

Fl. Plts. S. Afr.: Flowering Plants of South Africa

Jahrb. D. Kakt. Ges.: Jahrbuch der Deutschen Kakteen-Gesellschaft, Germany

Kakt.: Kakteenkunde, Germany

Nat. Cact. Jrn.: National Cactus and Succulent Journal, England

Succ.: Succulenta, Holland

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Uitewaal, A. J. 1948. Adromischus; in Nat. Cact. Jrn. III: 61-63.

Von Poellnitz, K. 1940. In Fedde 48: 87-113; l. c. 49: 58-65; see key for other references.

A NEW MAMMILLARIA

By GEORGE LINDSAY

Mammillaria boolii sp. nov.

Corpus simplex interdum parce caespitosum, subglobosum; areolae orbiculares, juventute parce lanuginosae; spinae laterales ca. 20, aciculares, pungentes, 15 mm. longae, flaventes; spina centralis solitaria 15 mm. longa porrecta basim laeviter incrassata apice brunnea, basim lutea; flores 25 mm. longi late infundibuliformes, perianthii segmentis exterioribus oblanceolatis, roseis, nervis medius viridibus, interioribus roseo-carmineis; baccae clavatae 30 mm. longae, 5 mm. latae, seminibus nigris globosis.

Mammillaria boolii new sp.: Plant, when collected, flat-topped and depressed level with the ground, but under cultivation and when turgid, spherical, 3.5 cm. high and 3 cm. in diameter, simple or occasionally caespitose, the branches arising from the axils of old tubercles, glaucous-green; tubercles in 5-8 series, terete, the lower ones dorsally flattened, truncate, the axils slightly lanate in youth, naked in age; areoles large, round, bearing dense white tomentum above the radial spines when young, naked in age; radial spines ca. 20, acicular, white, spreading, appressed, equal, 15 mm. long; central spine one, subulate, porrect, strongly hooked, 15-20 mm. long, yellow or horn-colored with darker tip; flowers 25 mm. long, 24 mm. broad when fully expanded, pink or lavender-pink, from axils of old tubercles; buds pointed, the tube 13 mm. long, the limb 12 mm.; outer perianth segments oblanceolate, entire, acute or apiculate, pink with an olive mid-stripe on the lower surface; inner perianth segments similar to outer ones, pink or pink-lavender with lighter margins; filaments white,

included; style white; stigma lobes 4, linear, pale green; fruit long-clavate, orange, smooth, to 30 mm. long and 5 mm. wide, perianth persistent; seeds black, dull, pitted, with constriction above the broad diamond-shaped hilum.

Type specimen: *Lindsay 2220*, collected at San Pedro Bay, Sonora, Mexico, April 30, 1952. San Pedro Bay is known locally as Ensenada Grande, and its location is 28°04' N., 111°16' W. The type specimen has been deposited in the Dudley Herbarium, Stanford University.

Distribution: This species is known only from the type locality.

Mammillaria boolii is named in honor of its discoverer, Mr. Herbert W. Bool, of Phoenix, Arizona. Mr. Bool has been interested in the desert flora for many years, and was one of the founders of the Desert Botanical Garden of Arizona. We have been companions on a number of collecting trips in Arizona and Mexico, and it was on one of these that this species was discovered.

Mammillaria boolii is closely related to *Mammillaria insularis*, which is found across the Gulf of California on San Marcos Island and on the Smith Island group in the mouth of Los Angeles Bay. The new species differs from *M. insularis* in that it lacks the very long, thickened, carrot-like roots and underground stems, as well as the densely caespitose habit, which characterize the latter. Apparently *M. boolii* produces branches only after injury to the apical meri-



FIG. 39. *Mammillaria boolii* in flower at the Desert Botanical Garden.
Photo by Claire Meyer Proctor.

stem, while *M. insularis* is simple only when young, with mature plants bearing several to over one hundred branches. The spines of the two species are similar in number and character, but those of *M. boolii* are much longer, and are yellow or horn-colored, giving the plant a golden aspect. The flower of *M. boolii* has a surprisingly long tube, and is deeper in color than that of *M. insularis*. The fruit is very long and narrow, and the seed apparently is unique, in having a constriction above the hilum.

Mr. Bool and I collected *Mammillaria boolii* in February, 1947. We had chartered a sport-fishing boat in Guaymas in order to make the trip to San Pedro Nolasco Island, and had anchored at San Pedro Bay to spend the night. We found the little plant growing in crevices in the soft volcanic rocks on the upper northern slope of the headland which forms the bay. It was growing in association with *Acacia willardiana*, *Erythra roezlii*, *Lemaireocereus thurberi*, *Ferocactus covillei*, *Mammillaria swinglei*, *Echinocereus scopulorum*, *E. engelmannii*, etc. Specimens were collected and deposited with the Desert Botanical Garden of Arizona. They flowered the following year and Director Wm.

Taylor Marshall very kindly drew up a description of the flower and plant, much of which is included here. Mrs. Claire Meyer Proctor generously made a special trip to the botanical garden when the plant was in flower in order to make the accompanying photograph.

I returned to San Pedro Bay in April, 1947, while making a rapid survey cruise in the Gulf of California,* and collected a few more specimens. Again, in 1952, I visited San Pedro Bay while with the Sefton-Stanford Expedition to the Gulf of California, and at that time collected the material which is being used for the holotype.

I would like to thank Mr. Herbert W. Bool, Mr. J. W. Sefton, Jr., Mr. Wm. Taylor Marshall, and Mrs. Claire Meyer Proctor, all of whom have contributed to the accumulation of knowledge about this little plant.

Botanical collections were made under permit granted by the Secretaria de Agricultura y Fomento, Direccion General Forestal y de Caza, Ofna. de Protection, and signed by Lic. Silvestre Aguilar.

*Cact. and Succ. Jour. XIX, No. 12, 181-186.

"ORCHID CACTUS"

By MRS. CACTUS PETE

Many centuries ago, in some remote geological age, when the world was new, when the glacial era had passed and while the Americas were still a steaming jungle, somewhere from out of the mists and chaos of this antiquity, somewhere among the newly forming wonders of nature, there was created a new type of plant life which was to have a most unique history. This was the first true CACTUS.

It is thought that perhaps this first cactus originated in South America, or even on the lost island of Atlantis. To the best of present day knowledge, this first cactus had leaves similar to those of the citrus trees of today, flowers somewhat like a wild rose in form but with an orange-blossom fragrance, and they bore the spine-like armor of the cacti as we know them today.

Due to the changing factors of climate and even of soil, Mother Nature fought a terrific battle for survival of her favorites. Her own stubborn desire to protect and progenerate her own, forced this newly born genus of plants to migrate over an ever widening area and as this original cactus invaded new regions, it altered its habits, its character and even its forms, for in that remote past, the only plants able to exist were those which could adapt themselves to this new life.

Slowly from out of these primeval forests there arose a complete series of plant genera, unrelated to the surrounding vegetation. From the subdivision of these genera, came the creation of entirely new forms until down through the ages, were developed the many species of cacti that are now known.

The jungles slowly receded and sometimes left in their place only vast arid regions. These plants, although born of the jungle, had a peculiar ability to retain their own moisture for long periods of time. Eventually these lonely denizens of the barren expanse became living symbols of our great American deserts.

These cacti were the first to become well known to man. Because of the publicity given them, it was soon assumed that all cacti were desert plants, however in the actual survey of total known cacti, it is probable that far less than half are actual desert dwellers. The majority would be found in the fields, the forests and the mountains.

Early European botanists, exploring the luxuriant jungles of the New World, in search of unusual botanical specimens, found wondrous plants growing high in the jungle trees. These

plants were strange indeed. They had the habits of the Orchid. They hung pendant from high in the trees. Their flowers seemed to be borne directly from the ends of the "leaves." These plants produced huge white flowers, which bloomed mostly at night and which gave forth a lily-like fragrance.

Surprisingly, these plants proved to be genuine members of the cactus family. Thus man had completed the circle backwards and had found in its seemingly primeval form, the most magnificent flowering cacti in the world. Many other types of cacti were later found in the jungles but only a few found their way to Europe and apparently those flat "leaved" flower-



FIG. 40. Orchid Cactus "First Place" was one of the early hybrids that has become rare in collections. E. S. Taylor photo.

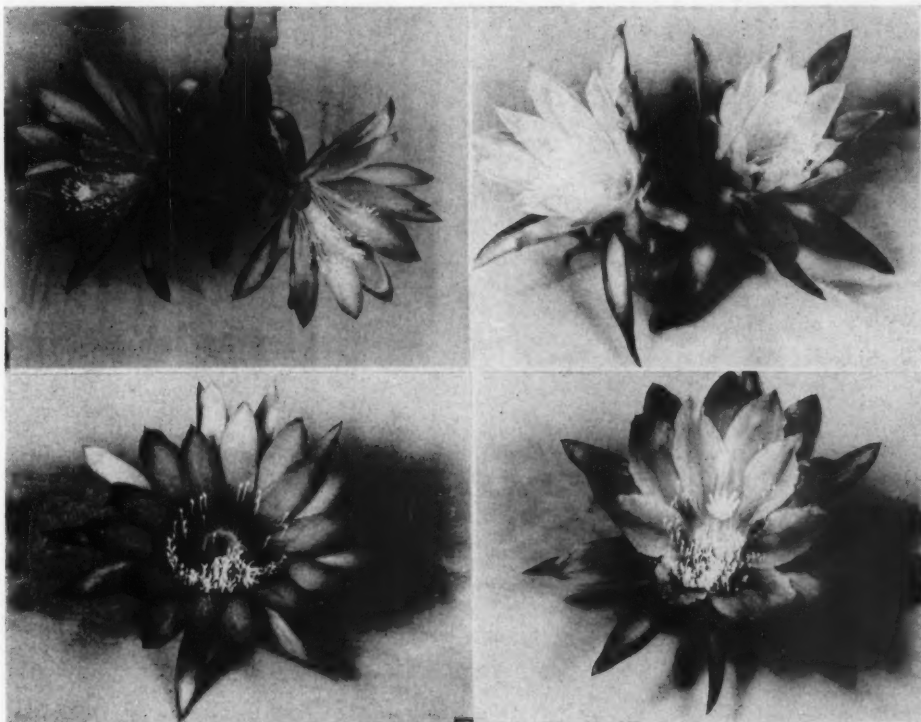


FIG. 41. Flowers of the Orchid Cactus from Cactus Pete's garden. (Left to right) Pete's Cupid, Joseph de Laet. Indian Maid, Sorcery.

bearing cacti held the most interest for the botanist. In America, we remained blissfully unaware of the beauty we were missing.

In 1812, the great botanist Haworth described this plant genus as *Epiphyllum* and gave a rather complete description of its first species as *Epiphyllum phyllanthus*. However not much attention was paid to this and in 1831, the botanist Link described the same genus as *Phyllocactus*, which name was generally accepted throughout the Old World.

Only a few of the wild species had been brought to the United States. These happened to be mostly night blooming and were soon known as "Night Blooming Cereus" although they were actually far from being a true *Cereus*.

In the meantime, European botanists were intrigued by the size and fragrance of these new flowers. All they lacked was color and they found that these plants could be cross-pollinated with some of the brighter hued cacti and thus, through hybridization, they introduced a new world of color.

In America, we were becoming more botanically minded. We became interested in these European hybrids, but only to the extent of im-

porting them and thus enjoying their work. We knew little about these plants in those days. Botanical works, written in foreign languages, were both unobtainable and not understandable to most people. Botanical terms were difficult to translate. Cuttings or plants, imported from Europe, arrived here in bad shape. No one seemed to know just how to grow them and much experimentation was necessary. Most of the early collectors were forced to graft their plants on sturdy cacti in order to make them live, for, as yet, we had not realized that these were true jungle plants.

In America, we had become acquainted with our own desert denizens. We had learned much about successfully growing them and, applying that knowledge, we were trying to give this new cactus the same treatment.

Soon we began to realize that this plant responded well to a little more shade, a little more water, and most unbelievable of all, it seemed to need added fertilizer. In the meantime, European botanical literature became more available. Some of our own scientists became interested in the plants and, at last, we realized that the original home of this cactus was not the desert

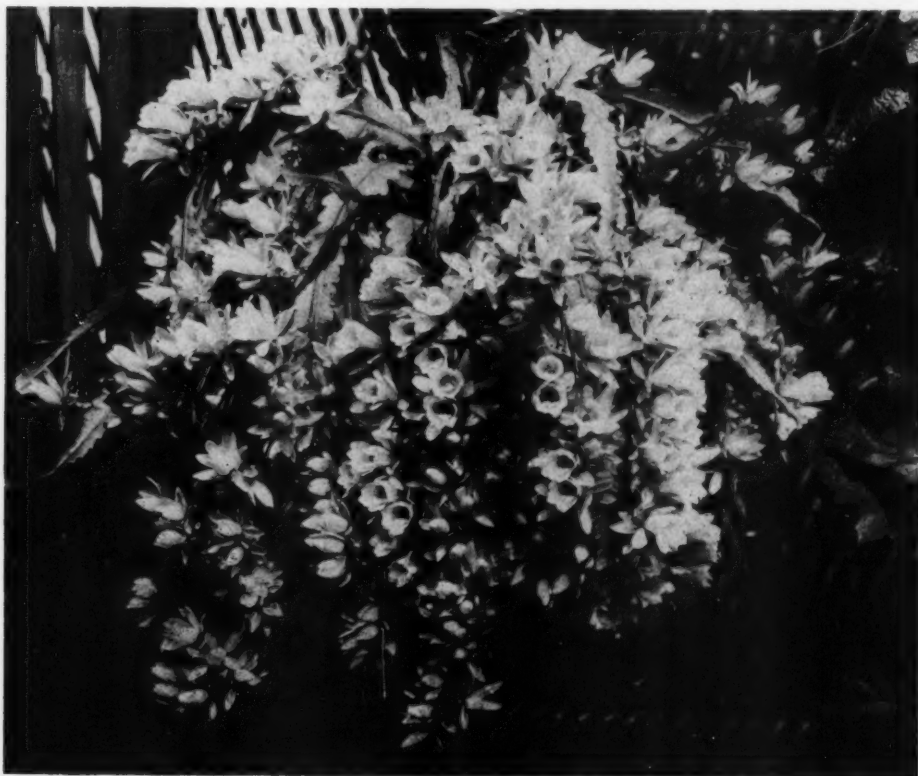


FIG. 42. Giant Empress with hundreds of pink flowers.



FIG. 43 (Left) Rosetta. (Right) Cameo.



FIG. 44. (Left to right) Richard Diener, Marina Special, Ecstasy, Queen Juliana, Acadia, Miss Hollywood—all from Cactus Pete's Gardens. Orchid Cacti will soon be in flower in a beautiful array of color and many forms.

but along the coast-line, in our own American jungle country.

The American botanists, Britton and Rose, began their research on these plants and in 1923, they re-established Haworth's original name of *Epiphyllum*, which actually held precedence over the name *Phyllocactus*, thus, in America, we finally gave complete recognition to our jungle-born cacti, for the name *Epiphyllum* is now recognized throughout the entire world.

When American hybridizers became interested in these plants it was soon discovered that the climate in California was ideal for the growth of these plants, in fact it was a great deal better than that of Europe and England where so much had already been accomplished. The hybrid *Epiphyllums* had taken the fancy of two very sincere and earnest gentlemen, Mr. H. M. Wegener of Los Angeles, and Dr. R. W. Poindexter of nearby Compton. They worked first with European imports, but were not long satisfied, for soon they had produced many original hybrids of their own.

Through their work, and that of Dr. A. D. Houghton of San Fernando, these hybrids were introduced to a flower-hungry public. Soon these *Epiphyllum* hybrids or "Orchid Cactus," as the hybrids were now called, were grown in California on a large commercial scale and were shipped to all parts of the world. The California-grown hybrids are equal to and often surpass those developed in Europe.

Only sixteen wild species of *Epiphyllum* are recognized at the present time but a complete list of "Orchid Cactus," including both American and European, would run well over 4000 varieties. Flower sizes vary from two inches to perhaps ten and a half inches across a single flower and the color range is complete except for a real blue, which is always lacking in the true cacti. Their lustrous texture and brilliant colors challenge the entire flower world.

Experimentation and greater knowledge of their original habitat, have taught us how to care for our "Orchid Cactus." We no longer treat them as desert plants. We know they grow best when treated more like the begonias, camellias or ferns. Since, in the wilds, they grow in the branches of jungle trees, in clumps of moss or other decayed plant material, through which there is a free circulation of air, we now know that they need a porous, well-drained soil. We know they like moisture but not saturation. We find that they respond best to a soil composed of equal parts of good garden loam, leaf-mold and coarse building sand, also that the addition of charcoal is always beneficial in keeping the

soil from becoming over-acid, for these plants are only semi-acid. We have learned that these plants are vigorous feeders and that extra fertilizer must be added each year, if we want a fine showing of flowers.

Hybridizing and growing these cacti from seed is a long, patience requiring process which few would care to undertake. Most of the plants grown from seed will be throw-backs to the parent plant, or the grand-parent. Only a few will have outstanding flowers and so the grower must discard countless plants. It often takes several years for the first flower on a hybrid and then perhaps it will be exactly like its parent.

Once a worthwhile hybrid has been established, the propagation of that particular one is easy. Like any other cacti, the *Epiphyllum* hybrid grows easily from a cutting. Flowers of plants thus grown will run true in color, shape and size. They will be exactly like those on the plant from which the cutting was made.

Selection of a cutting is simple. Old growth is best since its strength will produce a sturdy plant. Long cuttings bloom more quickly than short ones. The slip should lay in a cool place for from one to two weeks, so that the cut will thoroughly heal. When healed, plant the slip carefully about one and one-half inches deep. Water rather sparingly for the first month. The cutting is soon rooted and has become a plant on its own. Often these plants bloom their first year.

Whenever it is necessary to repot an adult plant, the soil around the plant should first be completely dry. New soil should also be dry. Take out the plant, separate if necessary, trim back the roots or partly remove the old soil. Replant it in the same size container for maximum amount of blooms. Withhold water for a week, then water sparingly until re-established. In this way, the plant will not be lost through transplanting as is occasionally the case when watered at once.

The "Orchid Cactus" needs some sunshine, but will produce lovely flowers in shade where there is an abundance of reflected light. They are always semi-shade plants and will grow wonderfully in a lath-house, under a tree or in a partly protected place on the porch.

They are unlike most tropical plants for, even though sorely neglected or given the very minimum of care, your "Orchid Cactus," like your dog, will reward you most generously. Their beautiful flowers with their rainbow hues will bring you just a bit closer to heaven itself, for they make you feel that at last, you have found the rainbow's end.

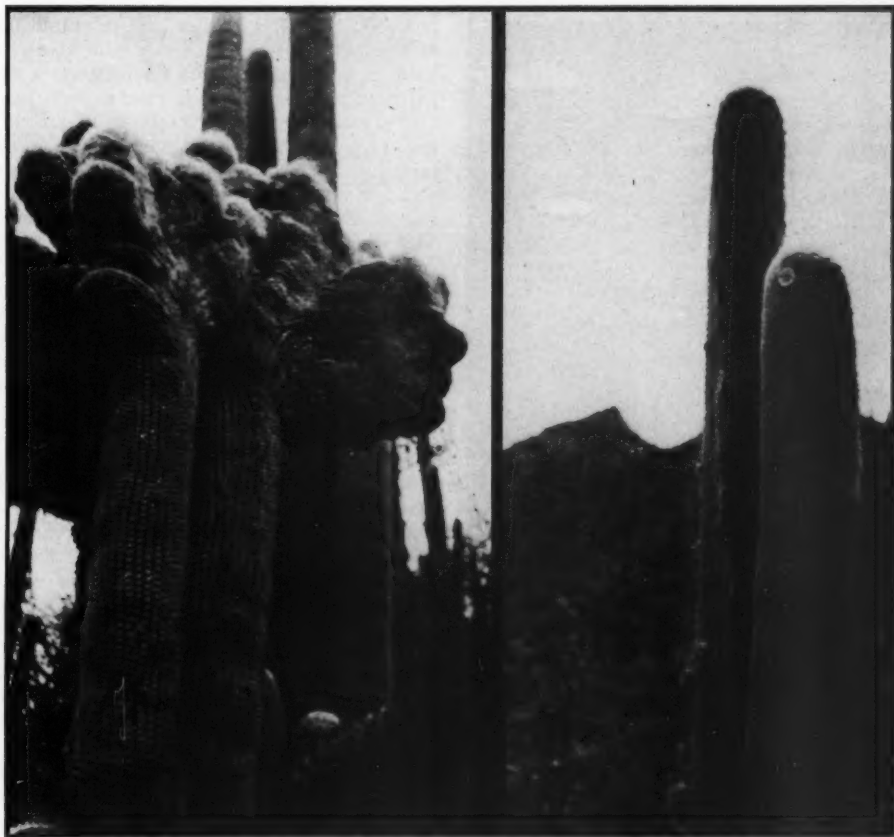


FIG. 45. (Left) An unusually large crest of *Cephalocereus senilis* in Hidalgo, Mexico, has been destroyed by ruthless collectors. (Right) Flowers in April and May are rose-colored, others "yellowish" as described by Dr. Oguita who took the photographs.

THE MEXICAN OLD MAN CACTUS

By WM. MASTRANGEL, *Rocking Horse Cactus Gardens*

The Mexican Old Man Cactus—*Cephalocereus senilis* (DC.) Pfeiff., *Pilocereus senilis* Lem., is probably the most popular cactus on the market. Next to the *Opuntias*, it is just about the most well known cactus in the world; in fact, here in our gardens, it is one of our best selling plants. Our stock of over 300 old men in various sizes, always seems to be dwindling. The Old Man of Mexico is not to be confused with other hairy "old men" types, such as: *Oreocereus celsianus*, the Bolivian Old Man; *Euphorbia lanata*, the Peruvian Old Man; and others. Our Mexican Old Man, a native of the Mexican states of Hidalgo and Guanajuato, is exemplified by its long coarse straggly white hairs giving it the appearance of a white haired octogenarian. I get quite a kick out of the ejacu-

lations of visiting tourists here in our gardens when they see the Old Man for the first time—such as "Oh, look at the old Grandpa!" "Take a look at that old hairy devil, will you?" "There's one that looks like 'n old desert rat!" etc.

While the Old Man Cactus is easily grown, it is still considered an exotic cactus. One reason for this is the high price of seeds which must come from native plants in old Mexico, as very few American grown plants have ever flowered. Seedlings from one to three inches are very pretty indeed; well cared for plants will keep their long white hairs and remain in fine condition up to four, five and six feet in height; then, as the plant becomes older, some of the hairs, especially near the base, are shed off or



FIG. 46. A commercial seedling of the Old Man Cactus when he is a boy of 5 years of age.

become patchy and the plant takes on a barky appearance towards the base, as is the case with most old *cereus*-type specimens. The rate of growth is slow—usually between one-quarter of an inch to one inch per year. Thirty to forty foot specimens are usually two hundred years old or more, and in this respect, closely resemble the rate of growth of *Carnegiea gigantea*—the Arizona Giant Saguaro.

No collection is complete without this beautiful white cactus. It stands out in any collection of succulent plants, and is usually the first one to be noticed and praised by visitors. I recently was given a crested form of *C. senilis* by a collector friend of mine in California. It is fan shaped, grafted on a *Trichocereus spachianus*, and is very beautiful indeed. We have imported the form—*longiseta*, the extremely long haired form of the old man; the hair on these specimens is usually between twelve and twenty centimeters long.

CULTURE—Although the Old Man grows in a fairly heavy clay type soil in which there are many slate rocks in its natural home, it seems to do best in a fairly rich well drained soil—composed of good top soil or silt, coarse granite gravel, leaf mold and charcoal. In its natural home, it grows on hillsides, which of course, gives the proper drainage. Since we cannot plant

our collection on a hillside, we substitute the artificial drainage system, which is of course, a loose gravelly soil. Lime is very important for the health of this plant. If your water is hard (limy), you don't have much of a problem; but if your water is only moderately hard or soft, it is well to add a little lime, or lime water several times a year or better still—get some old mortar and crush it a little then mix some in with your soil; approximately three tablespoons full to every gallon of soil. When you first acquire your "Old man," plant in dry soil and do not give it any water for at least two weeks. Thereafter, water during the growing season as you would any other desert type cactus, keeping it on the dry side during the winter rest period. It will take temperatures down to 24 degrees F. providing it has been dried off. The plant reaches flowering size at the approximate height of eighteen to twenty feet, at which time a thick woolly growth of hairs will be noticed at the top of the plant. This is called the pseudo-cephalium, from which the nocturnal flowers are produced. Very few people in the world have seen these flowers but they are, however, reddish-white in color and about two to two and one-half inches across—always partly hidden in the white hairs. In some sections of our country, especially near manufacturing areas, sooty, dusty, or smoggy air may have a tendency to darken the white hairs. Some customers tell me that they shampoo their old men, in such cases, with mild soap, and then rinse carefully with clear water. During this operation, if the plant is potted, the dirt should be well covered with cloth or paper and then the potted plant can be laid on its side for shampooing, thus the soap won't be saturated into the soil. Care must be taken in this process not to rub the hairs very hard—especially in the opposite way in which they grow, otherwise, the Old Man soon may become bald. Sunshine and fresh air are essential for healthy growth of the Old Man Cactus; it seems to do best under open lath or under the partial shade of a tree. It should get enough sunshine so that there is no etiolation (long stringy top growth).

I have spoken to many collectors who have made the trip down into Hidalgo in old Mexico and have seen the Old Man growing on the hillsides there in colonies. It must truly be a sight to see these white giants dotting the slopes in all their glory. The most interesting way for a collector to display the Old Man is to plant the specimen in a black ceramic pot. The white plant really stands out against the black of the container and truly makes this plant look like the monarch it really is—the King of all cactus.

Next issue—The Totem Pole Cactus.

QUESTIONS and ANSWERS

Conducted by
HARRY JOHNSON
Paramount, Calif.



Question: (1.) My Dam's Chin Cactus bloomed all summer and there are two flowers on it now. Is this normal? (2.) My Orchid Cactus Prof. Ebert sent out five growths from the small plant I received in the spring. Three of them are 2'-3' tall. They were out under an oak tree all summer. However now it is drooping and seems quite limp. When do they bloom? Mrs. Horace R. Lyons, North Carolina.

Answer: (1.) The Dam's Chin Cactus (*Gymnocalycium Damsii*) under certain conditions is almost always in flower. However, for the best continued health of the plant a dry resting period in the fall is helpful. They normally begin to show flower buds in January which is the beginning of their growing period. This about coincides with the rainy season in their home, Argentina. If the months of January, February and March are going to be very cold, cloudy and sunless you may prefer to keep them cool and dry to retard their growth until spring is closer. You may also prefer to have the early flowers and if so give more water, as much sun or light as possible and a minimum temperature of 45° or 50°. They don't need very much heat.

(2.) The Orchid Cactus, Prof. Ebert probably, has lost its roots. It may have had too much water in late summer or fall. I like to keep them a little drier at this season to allow the growths to mature. They store food then for the next year's flowers. If you feel the roots are gone wash the soil off and trim out the dead roots then repot in clean sand with a little leaf-mold added. Keep on the dry side for a month or so till new roots form. The atmosphere should be moist but not close. Give plenty of air. A minimum temperature of 50° or 60° is about right.

Question: Would like to know the age at which the following cacti may be expected to flower and fruit in the home garden. Henry Casebeer, Alberta, Canada.

Answer: The plants mentioned are all tree cerei related to *Cereus peruvianus*. These plants generally flower at about the 4th year when they are strong rooted, quick growing species. They will attain 4 to 5 feet in height. Much depends on their receiving plenty of sunlight in summer to mature the growth. Placing them outside during the summer but protected from long wet spells is a great help. When the warmth

of late spring induces new growth an application of fertilizer will get them off to a good start. Don't fertilize much past July or the new growth will not have enough time to properly ripen. With us they tend to flower on old growth toward the end of summer. Cuttings from mature plants often flower the first season.

Question: Is it possible to make an arm cutting of *Euphorbia inermis* ever form a central head as one can with *E. Bergeri*? Rose B. White, California.

Answer: Yes. The general way to propagate vegetatively the various species of *Euphorbia* which form a head from which arms grow is to root the arms in summer. In fall or the following year small heads will form under the sand and when they have reached the surface and formed arms they may be cut off and rooted. However, unless the cuttings are grown well and vigorously they will often simply continue to elongate, particularly if kept under glass. Put outdoors and feed them and two or more heads should appear.

Question: The *Oreocereus* (Old Man of the Andes) I have not been able to grow clean. That is, the plant when growing develops on or near the soil line a form of fungus. This disease, if disease it is, develops small brown spots which gradually spread and spoils the appearance of the plant. I would be obliged if you could give me some information about the wild plants, soils, etc. Sidney Brown, Sydney, Australia.

Answer: This so called "brown spot" probably has bothered every grower who has grown specimen cacti as it is found on several groups of plants. Whether it is a disease in the sense of being caused by fungus, bacteria or virus I do not know. This is a problem for a skilled laboratory worker to decide. What induces the attack is a growers problem. The plants I have observed which are quite subject to it (there are not a great many) come from regions where relative humidity is quite low. When grown in regions where rainfall is normal and thus humidity much higher they may spot. Also if the plants are not growing freely, if the roots are affected with nematodes or the soil played out, they become very subject to spot. A good, free circulation of air helps to prevent it. Some strains of various species may be particularly subject to it. One *Lobivia huascha rubra* always had it even when grown from clean cuttings. However, seedlings were not affected. Of course it also may have been a virus or bacteria lodged in the tissue.

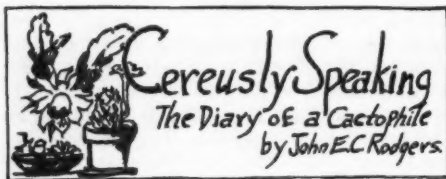
As to the *Oreocereus* they normally are not too bad offenders though they do spot. In the wilds they grow at elevations of 6,000' to 12,-

000' in south Peru, Bolivia and Chile. This is above the fog belt and within the rain belt and normally quite dry. It is a zone of low, very scattered scrub hardly fit even for browsing goats. The soil is variable and probably not a prime determining factor. In 1951 I saw thousands of them about Tarata, Peru, which is contiguous with their Bolivian and Chilean habitat. The plants were extremely variable, from hairless to very hairy, the hair varying from dark to snowy white. The plants were from 2' to 8' tall.

I know of no cure for the blemish after a plant is attacked as the epidermis is gone. To me the cause seems to be due to growing conditions, though it may well be a virus, etc., that garden conditions are particularly favorable to. At any rate give your plants optimum conditions, plenty of light, air and a suitable soil and not too much winter heat.

Question: Are there any species of hardy cacti that will survive at temperature down to 15 degrees below zero? Rockwell, N.Y.

Answer: The following may withstand the cold but it is doubtful if they will take wetness, too: *Neobesseyia missouriensis*, *Coryphantha vivipara*, *Pediocactus simpsonii* (in some parts of its range), *Echinocereus triglochidiatus* (probably from its more northern Colorado habitats), *E. coccineus* (northern Colorado and Yellowstone Park), *E. viridiflorus* (goes up to Wyoming), *Opuntia opuntia*, *O. fragilis*, *O. polyantha*, *O. tortispina*, *O. rhodantha*.



With the worst of our winter over, March and April's blustery days cannot dull the enjoyment I get from the returning green of the new growth of both cacti and succulents. The reawakening is due to the lengthened day with the return of spring from a 9 hour day Dec. 21 to 14 hours as of April 30. March 1 recorded an eleven hour day. With a "stove greenhouse" such as I have hand-fired with hard coal it is a relief not to hear the alarm clock at 3 a.m. to 5 a.m. insisting I get up to shake-down and refuel the stove. However, this winter was mild. The lowest temperature registered by my thermometer was 12° while the highest was 58°. Very little sunshine from January through March raised the temperature of my greenhouse above 80°. In spite of this lack the subtropicals as well as the tropicals have budded, bloomed and set fruit. The coolness (45°-55° night temperature), under which I grew my succulents has increased the luscious shades of the Gasterias, Kalanchoes and Crassulas; the "bloom" on the Echeverias, Kleinias, and Graptopetalum; the "plush" and colors

of *Echeveria pulvinata*, *E. setosa*, etc. Blooming (flowers) is behind schedule on most of these but so is it in a much warmer one (steam heated) with temperatures 55°-65° night. With the cacti some are two weeks ahead and others two weeks to a month behind schedule. We did benefit from Lake Erie which remained 34° through February, even if its moisture did help create cloudy weather.

My *Sempervivum*s in the open and in a strawberry jar on the back porch, where rain must beat in, have stayed green and plump with very little outer leaf shriveling and protective drying back. The hardy *Opuntia compressa* and varieties show some shriveling. No doubt the sap was thick enough to act as an anti-freeze for the "mild" winter we've had. The hardy Sedums—*S. eversii*, *maximum* and *spectabile* have shown brussel-sprout-like clusters in the borders all winter. The creeping *Sedums acre*, *sexangulare*, *anglicum* and *hispanicum* have not lost their longer stems as they usually do and are growing on old stems and producing new ones. My hardy Spurges (cousins to the Euphorbias) showed "buds" early in February, (*E. polycroma* and *E. heterophylla*). I have never tried them in the greenhouse because of their hardness both from root shoots and seeds, but I think they could be so used. Most of the hardied spurges are excellent in the rockery and bloom profusely early in the spring. The only drawback is they do spread rapidly.

My newest spurge is an unnamed one I found growing in a Pennsylvania garden last summer. It has a heavy round stem with alternate pairs of long, narrow white-veined leaves at 90° angles. It grows to a height of two feet. Blooms are greenish, boat-shaped with two to a stalk in June and July. Seeds I'm told are brownish and fairly large. Plants grow readily from seeds as well as root offsets. It prefer a good garden soil but will thrive among rocks in full sun. Its decorative nature both in garden and rockery make it an ideal plant. I left mine in a pot of soil outside the greenhouse where the alternate freezing and thawing merely added color to the stems and more leathery nature to the leaves. It is not a native as far as I've been able to discover and those who use spurges have wanted to get it.

My newest "culture discovery" is for *Crassula teres* (the rattlesnake Crassula). I have had it for several years and it was a great disappointment. It had three small pea-shaped offsets and a naked half inch of stem before its closely appressed leaves began. Others had it, coddled it and lost it, but mine was the same—very little growth and a dusty green color. Last fall I set it in an old cup and watered it generously every week—it worked, now it has grown one inch on the old stalk, the same on the three offsets plus 3 new stem offsets and the color is a beautiful olive-green. I shall wait with bated breath to see if mine goes the way of the others. *Greenovia aurea* responded to this same line of reasoning last year and was I proud to use it in our Midwest Cactus and Succulent Society exhibit in Cleveland, Ohio. Yes, water, good drainage, sandy loam and understanding do work wonders at times.

On the other hand *Pleiospilos* species resent my attempts to water and treat them "humanely." I've tried it and saved the ones I saw in time by rerooting in "moist to dry" sand. They do best if kept on the dry side, especially when the greenhouse is "cool."

Keeping the *Aporocactus* moist the year around never occurred to me until I saw how luxuriantly the genus did in two western collections. It's paying off, my two replacements of plants from my obituary column of five years ago under this new treatment

Continued on page 60



SPINE CHATS

LADISLAV CUTAK



I have been mentioning CORTISONE on this page ever since it broke into the news a few years ago, but never gave it a thought that I would ever use the drug. In February I was pruning cactus plants when a *Pereskia saccharosa* branch snapped off and lashed my face. A thorn imbedded itself a half-inch deep in my right eyeball but prompt attention, doctor's skill and Cortisone eyedrops aided in full recovery and restored normal vision. Had the thorn penetrated the pupil I would be minus one eye today.

Cortisone originally was used for arthritic conditions, but since its discovery new uses have been found for it in the treatment of various other afflictions. Recently Cortisone was used in the treatment of fulminant hepatitis (severe liver disease) and the response to treatment was spectacular according to Dr. Hector Ducchi of the University of Chile Medical School at Santiago. At least five patients who had been in coma for variable periods of time recovered, and since these are the first in which recovery was noted after coma, in more than 1,000 cases of hepatitis, the results are considered of great interest.

The sisal plant, whose hard fibers are today Brazil's sixth export product in order of value, and have earned the country upwards of a billion cruzeiros in foreign exchange in the past 3½ years, could bring further benefits to Brazil through industrialization of the waste from its leaves, according to details published in FOLHA CARIOCA, Rio de Janeiro paper. Experiments carried out in England as long ago as 1939 showed that practically the whole of the waste material from the sisal leaves has a useful application. Among the industries that can use products derived from sisal waste are the soap, solvent, drug, food and cosmetic trades, textile mills, ceramic plants, plastics factories, and many of the chemical products obtained from the plant are useful in chemical organic syntheses.

The so-called sisal waste consists of the green husk of the plant, and the pulp from the leaves. This waste produces three chief classes of products: a liquid extract, a solvent extract and residual substances. Liquid extract contains malic, succinic and citric acids, glucosides, sugars and saponins. Malic and succinic acids are used in some medicaments while citric acid is widely employed in effervescent salts, soft drinks and many food products. The glucosides are used in compounds for inhibiting scale formation and corrosion in boilers, and the saponins are valuable emulsificants, foam producers and soap substitutes. The solvent extracts contain wax, pectins and pectates. Pectin has wide application in the food industry, and is used to thicken soups and for the gelatinization of milk products. In cosmetics, pectates are used for beauty creams, hair fixatives and certain pharmaceutical products. They also find application in the processing of rubber latex and in making sponge rubber. They can be used to give consistency to paper, and are one of the ingredients of printing ink. The most important application of the pectates from the sisal waste is said to be in the textile industry, where they are basic to the manufacture of thread.

Upholstery of furniture is the latest application for which Brazil's "jack-of-all-trades" sisal fiber has been used. Press reports from Sao Paulo show that a multi-million dollar Brazilian furniture manufacturer, "Armacoes de Aco Probel, S.A." is consuming about 650 tons of the fiber for this purpose every year, and plans to increase consumption to 1300 tons a year in the next few months. Probel converts part of the fiber into a kind of paste, after which it is used as an insulant and interspersed between the springs and other upholstery materials. The industrialization of sisal in Sao Paulo keeps about 6,000 workers busy and that about 33 million pounds of sisal fibers are industrialized a year in 18 of Sao Paulo's factories.

THE STAPELIEAE OF SOUTHERN AFRICA by C. A. Luckhoff is primarily a picture book, although up-to-date keys and some botanical notes on the genera are included. As the preface states "this work has been designed to present in pictorial form the variety, extraordinary design and beauty of the Stapelieae" and it does just that. There are 283 pages with 252 Duotone and 5 colored plates. Most of the photographs have been considerably enlarged and show closeups of flowers with portions of stems which fairly make you drool. Luckhoff's book is a companion piece to White & Sloane's STAPELIEAE monograph and should be in the library of anyone who is interested in this group of plants. However, the price of \$14.00* seems awful high for the average succulent fan especially when the White & Sloane 3-volume monograph with hundreds of illustrations can be had for slightly less than this most recent book.

Ruy Teles Palhinha of the Botanical Institute of Lisbon observed that in *Aporocactus flagelliformis* flowers do not appear on stems whose extremities are intact, which keep up a vegetative development. On stems, the extremities of which died, accidentally or on purpose, floral buds appear. Should different floral buds appear on the same stem only one reaches full development, the others degenerate.

All of you Eastern travelers who plan to attend the cactus convention in California next July make it your business to stop off in St. Louis and pay a visit to the Missouri Botanical Garden, located near all principal routes which traverse the city. The South African House is replanted, well labeled and in good condition to view the interesting spurges, aloes and other succulents. The Cactus House is being repainted and the beds will be revamped. If I'm still here I will be glad to show you around the grounds. Let's all go West this year and make it the biggest convention on record. As usual we are planning for a hilarious fun session and many interesting talks.

*Distributed in U.S.A. by Abbey Garden Press, 132 W. Union St., Pasadena 1, California.

Robert Hurliman, Pieterlen, Switzerland, would like to exchange postage stamps, first-day covers, etc., for cactus books and magazines.

CEREUSLY SPEAKING: from page 58

are budded with plenty of vigorous new "tails" growing from the parent stalk and new growth at the ends of the older growth. The Aporocacti like a moderately warm, well ventilated position with plenty of light. I am sure I could have avoided the demise of my 3 foot tailed plant if I had kept it moist, the other ponderables have remained the same. I, no doubt, was lead astray by Wm. Watson in Cactus Culture, page 34, "If planted in baskets, it should be potted in porous soil, and kept moist in summer and perfectly dry in winter. Peru, Introduced 1690." In an English cottager's window with moderate winters, a steaming teakettle and cool temperatures which central heating ruins for us I'm sure Watson was right, but let's keep ours moist. It works for me and both plants are on their own roots.

I've never had any trouble with *Cereus Mallisoni* (*Aporocactus flagelliformis* x *Heliocereus speciosus*) grafted on a foot long piece of *Selenicereus pteranthus*. It blooms year after year and puts out new shoots also.

To be continued

A CACTUS COLLECTOR IN THE ANDES

This interesting series will be continued in the next issue. The photographs did not arrive in time for publication. We have had many requests that Mr. Harry Johnson tell more about his travels in South America.

LIBRARY NEWS

We, the Cactus and Succulent Society of America, Inc., wish to announce that our library is now open to our members for the borrowing of books. Mrs. Orva Bokarica is the new Librarian, 6014 Piedmont St., Los Angeles, Telephone CLeveland 7-6919. After many hours of hard work, she has catalogued, classified, numbered, cross-filed, indexed, and all the other things that necessarily go into getting a library into shape. She has also made a catalogue you may choose your books from, for to allow everyone to pull books out as they see fit would entail many more hours of work straightening up the library.

Mrs. Bokarica is much more centrally located than the previous Librarian and her home can be reached by auto, streetcar or bus. The library contains many fine books, many of them gifts from the authors.

Would suggest you phone or write for an appointment before arriving at her home. You will find her at home most of the time and know you will enjoy meeting her.

ETHEL RUSH, Secretary.

ANSWERS FROM PAGE 40

1. *Euphorbia heptagona* (left)
2. *Pachycereus marginatus* var. *gemmatus* ? (right)
3. *Astrophytum myriostigma* (left)
4. *Euphorbia borrida* (right)
5. *Euphorbia pseudocactus* (left)
6. *Hylocereus undatus* (right)
7. *Davallia dentata* (left)
8. *Echinocereus pentaloebus* (right)
9. *Agave Victoria regina* (left)
10. *Leuchtenbergia principis*, agave-cactus (right)
11. *Tephrocactus tuna* (left)
12. *Kleinia articulata* (right)
13. *Rhipsalis cereuscula*, ricecactus (left)
14. *Echidnopsis tessellata* (right)
15. *Lophophora williamsii* (left)
16. *Euphorbia meloformis* (right)
17. *Perskiopsis porteri* (right)
18. *Euphorbia splendens* (right)
19. *Euphorbia grandicornis*
20. *Aloe aristata*

FROM MEXICO

My new Cacti Price List of 1953 has just been finished. It contains a good number of new discoveries. If you really are interested in rare Cacti, just write for my list to:

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